

FRIDAY, JUNE 22, 1883.

THE ROYAL SOCIETY OF CANADA.

THE Royal society of Canada held its second annual meeting in the Parliament house at Ottawa on May 22-25, under the presidency of Dr. J. W. Dawson. This society was organized, as our readers may know, a year since, under the auspices of the governor-general of Canada, the Marquess of Lorne, and includes four academies or sections, each with twenty members and a sectional president or chairman. These sections are as follows : I. French literature, history, etc. ; II. English literature, history, etc. ; III. Mathematical, physical, and chemical sciences ; IV. Geological and biological sciences. Their presiding officers for the past year were respectively, J. M. Lemoine, Daniel Wilson, T. Sterry Hunt, and A. R. C. Selwyn ; the general officers of the society being, J. W. Dawson, president ; P. J. O. Chauveau, vice-president ; J. G. Bourinot, honorary secretary ; and J. R. Grant, honorary treasurer.

There was a good attendance, about two-thirds of the members being present, besides which were numerous delegates from various local literary and scientific societies throughout the Dominion. These, by the rules of the Royal society, are entitled to appoint each year a delegate to attend the annual meeting, and present a report of their work and progress. In addition to these, various foreign societies were invited to send delegates ; in response to which, Dr. T. Sterry Hunt had been charged to represent the National academy of sciences, and Professor Alpheus Hyatt came in behalf of the American academy of Boston. The Institut of France had appointed Mr. Xavier Marmier, of the Academie française, their delegate ; and the French government had offered to send him at the expense of the state, but sudden illness prevented his presence.

After organizing in general session on Tuesday, the society at once divided into its four sections, and proceeded to the reading and discussion of papers, to which were devoted the first two days, with the exception of Wednesday morning. This was set apart for the pub-

lic exercises of the whole society, which then assembled in the Senate chamber of the Parliament house, the Marquess of Lorne and the Princess Louise being present. The Marquess, to whose zeal for the advancement of letters and science the inception of the society is due, made an address of welcome, congratulating the society on the success which had attended its first year's work. He informed them that the Queen had been graciously pleased to accord to it the title of the Royal society of Canada ; that Parliament had granted it an act of incorporation, and, moreover, voted an annual sum of five thousand dollars for the publication of its proceedings and transactions.

After pointing out the examples of munificence shown in the encouragement of science by the federal and state governments of the United States, he gave much advice as to the future conduct of the new society, all of which was characterized by the eminent good sense and practical wisdom which distinguishes him. He urged the members of the society to sink all sectional differences and distinctions of province, creed, or race, and aim only at a higher standard of excellence in letters and in science.

Dr. J. W. Dawson then gave his address as president. After a review of the work already done in letters and science in the Dominion, he spoke of the desirableness of a great national museum at Ottawa, and then proceeded to speak in eloquent words of the mutual relations of letters and science. We take the following extract from a report in the *Montreal gazette* of principal Dawson's speech : —

"In conclusion, he referred to the connection of science with literature. The two departments were in this society intimately associated, the literary sections being in some sense scientific as well. Science has a literature of its own, great and increasing, which competes with history and fiction for the popular eye and ear. Nature, rather than art, is the foundation of the best literature. It is on this, rather than on the graces of composition, or the tricks of style, or the flowers of imagination, that enduring literary fame must be built. This is especially the case in a country where history has been and will be marked out by its physical features and resources, and where our real poetry is that of our great rivers

and vast lakes, our boundless plains, our forest solitudes and changeful climate. These are unwritten poems, which have impressed themselves on the minds of our people more than any thing man has yet said or done; and he who most truly interprets them will build up the most lasting fame. For this reason he rejoiced that the society embraced both literature and science; and he was profoundly convinced, that it was for the highest interest of Canada, that, while its scientific men should be men of culture, its literary men should be men of scientific knowledge and scientific habits of thought."

Dr. Chauveau, the vice-president, followed in a brief discourse in French on the progress of both French and English letters in Canada, after which Mr. Louis Frechette, the well-known poet and laureate of the French Academy, recited with much grace and feeling a poem on The discovery of the Mississippi.

On Thursday, the Queen's birthday, the morning was given to a business-meeting of the society, after which the members and delegates were entertained at lunch by the governor-general at Rideau Hall, and were subsequently received by the princess at a garden party. Friday morning was devoted to receiving reports, the election of officers, and other business. In sections I. and III., Messrs. Louis Frechette and J. B. Cherriman were chosen chairmen in place of J. M. Lemoine and T. Sterry Hunt. Dr. Dawson, the president, having declined re-election, Dr. P. J. O. Chauveau, the vice-president, was elected in his place as president of the society, and Dr. T. Sterry Hunt as vice-president, for the ensuing year.

It would be foreign to our purpose to give an account of the communications on literary and historical subjects which were presented to the first and second sections of the society during the meeting. One of these, however, which, on account of its especial interest to the society at large, was by request read in general session, deserves notice. This was a paper by Dr. Alpheus Todd, librarian of Parliament, on the relation of the new royal society, and of similar societies, to the state, and was replete with valuable information and suggestions. He sketched the history of the Royal society of arts of Jamaica, which is there doing an important work, and then gave an account of the Royal society of New South

Wales, a colony which has already made great advances in all matters relating to intellectual progress. That country, we were informed, now numbers about a hundred literary and scientific societies, or 'one to every one hundred and fifty adult males of the population.' A government astronomical observatory, a geological survey, a botanic garden, a gallery of fine arts, and a free public library, the latter under the direction of the minister of public instruction, are among the evidences of the enlightened educational policy of this colony; and to crown the whole we have the Royal society of New South Wales, which aspires to lead the scientific movement of the country, and to give aid and direction to all its various scientific and literary institutions.

Dr. Todd then proceeded to review the history of the Royal society of London with especial reference to its present important position in relation to the state. This body, which has, moreover, considerable revenue of its own, has now for more than a third of a century received from the imperial government an annual grant of one thousand pounds, to be employed in aid of scientific research at the discretion of the president and council of the society, — an amount which, since 1876, has been augmented to from four to five thousand pounds annually, without counting special grants for astronomical and other investigations conducted under the auspices of the Royal society. To it was intrusted the organization of the Challenger expedition. The Weather bureau, moreover, with its annual expenditure of fifteen thousand pounds, originally under the Board of trade, is now conducted by a commission appointed by the crown on the nomination of the president and council of the Royal society. This disposition of the British government to place the scientific work of the nation under the control of its Royal society is an example already imitated by New South Wales, and one which will, it is hoped, be followed by the government of the New Dominion. Dr. Todd did not allude to the National academy of sciences of the United States, one object in the creation of which was the establishment of a body to serve as scientific aids and councillors to the federal government, — a function which they have efficiently discharged on many occasions with vast advantage to the state. The United States Congress has, however, thus far in its relations to the National academy, failed to imitate the wise generosity of the British parliament, or even that of the Dominion parliament to its newly formed Royal society.

Among the papers in section III. may be mentioned one by Professor McGregor of Halifax, on the variation of the polarization of electrodes with their difference of potential; one by Professor Dupuis of Kingston, on the construction of a sidereal clock to show mean time; and one by Capt. Deville of Ottawa, on the measurement of terrestrial distances by astronomical observations, in which he proposes to employ the difference of azimuths instead of the difference of latitudes. Mr. Baillargé of Quebec contributed papers on some problems in hydrographic surveying, and on suggestions for a new edition of Euclid.

Dr. Harrington of Montreal gave a description, with analyses, of two rare minerals now found for the first time in Canada,—meneghinite and tennantite; and Dr. Ellis of Toronto described telluric gold-ores found on Lake Superior, exhibiting tellurium extracted therefrom; he also gave an analysis of a remarkable sulphur-water found near Port Stanley, Ontario, and described certain applications of Löwenthal's method for the determination of tannin. This was followed by an account, by Mr. Thomas Macfarlane of Montreal, of certain unexpected reactions attending the decomposition of sodium sulphate by carbon.

In the second day's session, Mr. Sandford Fleming discussed the question of a universal meridian for the regulation of time; after which, reports were presented of the observations made, at various points throughout the dominion, of the late transit of Venus, successful observations being reported from Cobourg, Ottawa, Kingston, and Winnipeg.

Professor Haanel of Cobourg described at length his ingenious mode of blowpipe-testing by means of hydriodic acid, and subsequently, in an evening session, gave experimental demonstrations of its application. His process depends upon the conversion of the various metals into volatile iodides, which are condensed on plates of plaster of Paris, and, by their different colors and subsequent behavior, are found to afford ready means of identifying and distinguishing, at a single operation in many cases, several elements in a mineral compound. Mr. Gisborne read a paper giving an account of recent progress in telegraphy, and Mr. Macfarlane described some interesting phenomena of double decomposition presented in the reaction between sodium chloride and zinc sulphate. This was followed by a paper by Dr. T. Sterry Hunt on the mechanical transfer of matter in the process of segregation, as shown in mineral masses,—a phenomenon which, in the discussion following, was shown by Mr.

Thomas Macfarlane to be well illustrated in the concentration which occurs in the process of kernel-roasting of cupriferous pyrites.

In section IV., Dr. Selwyn of the Geological survey of Canada read a paper on some features in the geology of Lake Superior, most of the points of which have lately been discussed by himself and others in the pages of SCIENCE. At a subsequent meeting a discussion of this paper took place, Messrs. Bell, Macfarlane, Sterry Hunt, and J. W. Dawson taking part therein, and contesting many of the views of the author. Principal Dawson presented a paper on spores and spore-cases from the Erian rocks, of which an abstract will be found in our weekly summary, under Botany. A detailed study of the distribution of the subdivisions of the carboniferous rocks in the maritime provinces was communicated by Mr. E. Gilpin, jun.; and Dr. G. M. Dawson described the triassic rocks of the western parts of the dominion. Dr. Robert Bell gave an account of the soils of the Canadian north-west territory, an abstract of which appears farther on, under Physical geography. An interesting discussion followed the reading of this paper, in which Professor Macoun and Dr. J. W. Dawson took part. Dr. T. Sterry Hunt made a communication entitled 'Studies of serpentine rocks,' in which, after sketching the history of opinions for the past century as to the origin and geognostical relations of serpentine, he proceeded to describe the modes of its occurrence in various parts of Europe and North America, particularly noting the serpentines of Pennsylvania and those of the vicinity of New-York City, including Staten Island. He also presented a memoir on the question of the Taconic system in geology. Prof. L. W. Bailey gave an interesting account of Indian remains found in the province of New Brunswick.

The foregoing list of papers presented to the scientific sections of the society is unavoidably incomplete and imperfect, communications having been made, among others, by Prof. E. J. Chapman of Toronto, and Dr. J. R. Grant and Professor Macoun of Ottawa; to which should be added a paper by Mr. G. F. Matthew of St. John, N.B., in continuation of his studies on the trilobitic fauna of the Cambrian rocks of that locality, with numerous figures. It is understood that the various memoirs presented to the society, both at this meeting and at its first organization a year since, will soon be published in the form of transactions, in quarto, with suitable illustrations, making what we trust will be the first of a long series of Transactions of the Royal society of Canada.

THE INTERNATIONAL FISHERIES EXHIBITION.—SECOND PAPER.

THE International fisheries exhibition has thus far been successful to a degree which astonishes its most sanguine supporters. At least 200,000 people passed through the turnstiles during the first week. This number of visitors represents receipts to the amount of \$45,000, in addition to \$40,000 or thereabouts from the sale of season-tickets. The official catalogue is said to have cleared \$15,000 above its cost, through advertisements, before a single copy had been sold; and the first edition of 25,000 copies is nearly exhausted. The arrangements for lighting the exhibition galleries by the various systems of electrical illumination have not been completed, and the exhibition is now closed at 7 P.M.: when it is kept open until 10, the number of visitors will doubtless increase; for, in addition to the legitimate attractions of the exhibition, thousands will be induced to attend by the illuminations and music in the gardens of the Royal horticultural society, in which the exhibition is held. On the opening day, only the court and the holders of season-tickets were admitted. The next public day was Whitsun Monday, one of the half-dozen or more new 'bank holidays' which have recently been bestowed upon the British public by Sir John Lubbock's parliamentary bill. Not less than 45,000 people paid their shillings at the door, and at one time 8,000 entered in a single hour. The attendance on the following days was less; but on Wednesday, when admission-tickets cost half a crown, nearly 12,000 were present. It is evident that the entire liabilities of the executive committee, amounting to fifty or sixty thousand pounds, will be met long before the close of the exhibition in November. It is almost certain that the profits will be applied, as was done after the great exhibition of 1857, to some object of public educational importance. The press is beginning to urge that this shall be the establishment of a National museum of fisheries at South Kensington; and the action of the management of the South Kensington museum seems to indicate that such is their purpose, for they have appointed a committee of four to take charge of the interests of such permanent fishery collections as may grow up as a result of the exhibition. This committee consists of Edward Birkbeck, M.P., honorary general manager of the exhibition, Sir James Maitland, director of the South Kensington museum, Professor Huxley, and Dr. Day; and in its constitution must

certainly be satisfactory to the scientific men of England, who are complaining through the columns of *Nature* that this present exhibition differs from its continental predecessors in having been organized without the co-operation, to any very great extent, of the professional zoölogists of the country.

The readers of *SCIENCE* have already seen in the daily papers descriptions of the events at the opening of the exhibition on the 12th. The entire English court was present; and the gorgeous costumes of the royal family and their households, the picturesque garments of the foreign ambassadors and commissioners, the military and naval officers, the yeomen of the guard, the Queen's watermen, the English, Scotch, and Irish fishermen, the fishwives from Scotland, Belgium, France, and Holland, mingled with the bright decorations and the striking objects among which they were passing, made the scene very brilliant and impressive. The building devoted to North America contributed its contingent to the ethnological display of the day. Canada had a Melicete Indian in gala dress; the United States, a Carolina negro clad as a whaler, besides numerous lay-figures of its fishermen in their customary dress, so lifelike in appearance that they were constantly mistaken by visitors for living men.

Science was very inconspicuous in this rainbow-hued pageant; but I noticed in the procession Professor Huxley, in the costume of Inspector of fisheries; Dr. Day, in the uniform of Surgeon-general; Professor Smitt, in that of the Royal Swedish academy of sciences; Professor Honeyman, Commissioner from Nova Scotia, in scholastic dress, with the scarlet cape of Doctor of civil law; and Baron de Solsky, Director of the St. Petersburg museum, his breast ablaze with decorations. The most imposing figure of all was that of Professor Richard Owen, whose venerable form, strong features, and flowing white hair, were brought out in strong relief, against the bright colors around, by his coat and skull-cap of black velvet.

On the evening of the opening day, all the officials and commissioners were entertained at a banquet in Fishmongers' Hall. The most noteworthy events of this occasion were the thoughtful speeches of the Prince of Wales and his brother the Duke of Edinburgh. The former had already tersely demonstrated his appreciation of the objects of the movement by the remark, "The purpose of this exhibition is to illustrate the present and past condition of one of the most ancient, exten-

sive, and important of industries, and to promote that careful collection and discussion of facts by means of which alone we can hope to deal in a satisfactory manner with the many difficult, practical, and scientific problems connected with fish and fisheries." At the banquet he laid especial stress upon the practical results which he hoped might result to the fisheries, and upon the importance of stimulating every possible scientific invention for the saving of life at sea.

The remark made by one of the speakers at the banquet — "that, by consenting to act as president of the exhibition, the Prince of Wales had done more than any man had ever done before for the fisheries of the world" — sounded strangely to an American; but, discounting the courtier element in this speech, the fact remains, that much of the success of the exhibition, and of its consequent possible benefit to Great Britain, is due to the active part which the Prince has taken in its interest.

The newspapers, from *Punch* to the *Times*, be they social, commercial, literary, comic, or scientific in their scope, are full of the exhibition. Many of them announce special numbers, or series of special articles, devoted to its discussion; while at least two periodicals, one an illustrated monthly, are established as its special exponents. The *Times*, which Emerson has told us thinks for all Englishmen, and 'is their understanding and day's ideal daguerrotyped,' gave an entire page on Monday to a description of the opening, and for several days has been printing editorials discussing the subject from various stand-points. It has printed a column article upon the exhibit of the United States, and promises two more special articles. In the first it is remarked, that, in variety and completeness of illustration, the collection from the United States is not surpassed by that of any of the foreign contributors. This verdict is confirmed by most of the editors, and in especially strong terms by *Land and water* and the *Field*, the two fishing-journals; the latter remarking, "The whole American court affords food for study, and, for completeness, is beyond comparison the best in the exhibition, whether as to fishing-vessels or fishing-gear." Especially gratifying is the letter sent to the *Times* by Gen. A. Pitt Rivers, the ethnologist, who draws attention to the fact that this is the only department in the whole exhibition which is arranged historically.

In the Chinese, Japanese, Scandinavian, and Dutch courts there are objects which the scientific student of the arts of life may pick out

and arrange in their proper order in his own mind; but in that of the United States, following the method adopted in the National museum at Washington, something more is attempted to bring the department into harmony with modern ideas. "Models showing the development of the art of ship-building have been arranged in sequence; the various contrivances for catching fish have been shown in association with the rude appliances of savages, from which they sprang; and the improvements and varieties of recent times have been placed as far as possible in chronological order. This gives to the exhibition a value which is apart from commerce, and an interest which is beyond the mere requirements of fish-culture; and it may be regarded as one out of the many indications of the way in which the enlightened government of the United States marks its appreciation of the demands of science."

The press is full of plans for the practical outcome of the exhibition. Some of the editors expect to see fish cheaper; some, to see the cheaper kinds of fish coming into general use; some, to see fish of all kinds more generally used; some, to see an immense increase in the yield of the fisheries; some, to see legislation stricter and more strongly enforced. Professor Huxley, when asked what his expectations from the exhibition were, replied that he had none at present beyond a general awakening of interest in fish-culture and the fisheries, from which, in time, some good would certainly result. The conference to be held in June, for the discussion of various questions of practical and scientific interest, will doubtless be one of the most important features of the exhibition. Professor Huxley will deliver the opening address; and the words of wisdom which shall then be uttered must necessarily have much influence in determining what are to be the benefits of this great international convention to Great Britain and to the world at large.

RECENT DEEP-SEA SOUNDINGS OFF THE ATLANTIC COAST OF THE UNITED STATES.¹

THE explorations of the Gulf Stream, instituted by Alexander Dallas Bache, superintendent of the coast-survey, and carried on under his direction between the years 1845 and 1860, though necessarily to a great ex-

¹ Abstract of Appendix no. 19. Coast and geodetic survey report for 1882. Communicated by the superintendent of the U. S. coast and geodetic survey, Washington, May, 1883.

tent tentative in their nature, have furnished results of great interest and value to the navigator, have stimulated later researches, and have led to the adoption of a definite plan, according to which have been made the observations for depth and temperature in the waters of the Gulf of Mexico, the Caribbean Sea, and in those off the Atlantic coast of the United States.

At as early a date as practicable after the close of the civil war, a systematic investigation was begun by deep-sea sounding and dredging, combined with observations of surface, serial, and bottom temperatures, and of currents, in the Gulf Stream and in the Gulf of Mexico.

In a communication made to the National academy of sciences in 1880 by J. E. Hilgard, M.N.A.S. (*Amer. journ. sc.*, April, 1881), upon a model of the Gulf of Mexico, a condensed statement is given of the results of the exploration of the basin of this great inland sea, as derived from the work organized by Benjamin Peirce and Carlile P. Patterson, superintendents of the U. S. coast-survey. This exploration was begun by Assistants L. F. Pourtales and Henry Mitchell, U. S. coast-survey, with the aid of Master R. Platt, U.S.N., in 1868, and continued by Commanders J. A. Howell and C. D. Sigsbee, U.S.N., in 1872-74 and 1875-78, in the coast-survey steamer Blake. With the improved methods of sounding, and the mechanical appliances perfected by Commander Sigsbee, the work in the Gulf of Mexico was brought to a successful conclusion, and under Commander J. R. Bartlett, U.S.N., it was extended to the Caribbean Sea.

Sketch no. 21, Coast and geodetic survey report for 1879, shows the soundings in these waters and their approaches, in depths ranging from 100 to upwards of 3,400 fathoms.

Similar investigations have since been prosecuted by Commanders Bartlett and Brownson, U.S.N., under the direction of Superintendents Patterson and Hilgard of the coast-survey, in the western part of the North Atlantic,—that great embayment, which, limited by Newfoundland on the north, and by the Windward Islands on the south, might be not inaptly named the Gulf of North America.

The depths and temperatures obtained by these officers, upon lines run normal to the coast across the course of the Gulf Stream, and upon other lines connecting with those run by H. M. S. Challenger in 1873, are shown upon the accompanying chart. A reference to it will make apparent the part taken by the coast-survey in developing the configuration

of the ocean-bed between the Bermudas and the West India Islands, and northward to the banks of Newfoundland, and in defining the limits of the continental plateau, which, extending from the coast to the 100-fathom line, may be described as the western rim of this great basin of the North Atlantic.

It was from these explorations that data were derived for the construction at the coast-survey office of the relief model of the western part of the North Atlantic, now on exhibition at the London international exposition of fish and fisheries.

Some interesting details of his work have been communicated by Commander Bartlett, who, during the summer of 1880, was engaged in dredging and sounding off the coast in the vicinity of Charleston, S.C. The first line run revealed the remarkable character of the bottom.

The first sounding and haul was made in 142 fathoms, south-east of Cape Romain. After this, in steaming to the eastward, taking frequent casts to find the depth at which it was desired to dredge, to their astonishment the water did not deepen as they expected, and they had crossed the supposed axis of the Gulf Stream before getting 300 fathoms at any sounding. Commander Bartlett, in his report, says, "The bottom was hard coral rock, but the sounding-rod always brought up small fragments of coral. We found but very few traces of animal life on this bottom, but made good hauls on its edge. For fifteen miles or more from the 100-fathom line we found a very strong current setting to the south-west. When the trawl was down, we tailed in that direction, and dragged at the rate of 2 knots without steam. When in the Gulf Stream, we found the current to the northward and eastward 2.6 knots per hour. The water deepened east of the axis to 382 fathoms, but shoaled again to 337 fathoms."

The lines run during this and the following season showed the same unmistakable plateau extending from Cape Hatteras to the Bahama Banks, the depths increasing but slowly until about 500 fathoms, after which they increased rapidly to the great Atlantic basin, at a depth of between 2,000 and 3,000 fathoms.

Commander Bartlett says in his report of the second season, after completing this work, "The eighteen lines of soundings run normal to the coast from Jupiter Inlet, Fla., to Currituck, N.C., by the steamer Blake; and the observations taken by the hydrographic party under my command gave very interesting data in regard to the physical features of the bottom

of the ocean over which the Gulf Stream flows. Instead of a deep channel, which has been previously reported, our soundings show an extensive and nearly level plateau extending from a point to the eastward of Bahama Banks to Cape Hatteras. Off Cape Canaveral it is nearly 200 miles wide, and gradually decreases in width to the northward until reaching Hatteras, when the depth is more than 1,000 fathoms within 30 miles of the shore.

"This plateau has a general depth of 400 fathoms, suddenly dropping on its eastern edge to 2,000 fathoms. The soundings in the strength of the current were all taken with the 60-pound shot-sinkers, the time allowed for the sinker to reach the bottom being less than one minute to each 100 fathoms in depth. Most of the soundings taken each side of the stream when not in strong current were taken with a 36-pound lead on the sounding-wire, the lead being reeled back. . . . It will be observed from the bottom specimens that the course of the Gulf Stream can almost be traced by the character of the bottom.

"On each side of the stream the sounding-cylinder brought up ooze. In the strength of the current, the bottom was washed nearly bare, the specimens being small broken pieces and particles of disintegrated coral rock. This bare portion was very hard, and the sharp edge of the brass sounding-cylinder came up very much dented and defaced."

During the summer of 1882 the Blake, under command of Lieut.-Commander W. H. Brownson, was engaged in sounding off New-York entrance. The charts have hitherto shown a spot about 100 miles south-east of Sandy Hook known as the '145-fathom hole.' In her soundings, the Blake discovered this hole to have a most remarkable character.

Its depth varies from 150 to over 450 fathoms, the bottom being mud; and in about the centre a knoll of mud, gravel, and shell rises up to within 64 fathoms of the surface. The dividing-ridge between the hole at its deepest point and the deep water outside has a least depth of 129 fathoms. There seems to be a continuation of irregular character of bottom, which extends from Sandy Hook about south-east; for about 200 miles farther the depth is over 3,000 fathoms, surrounded by very much shallower depths.

During the past winter the vessel has been engaged in developing the limit and general character of the great Atlantic basin between Bermuda and Bahama, and along the outside of the West India Islands as far to the eastward as St. Thomas. This cruise has been of

great interest. The bed of the Atlantic is shown to have a general depth of 2,700 or 2,800 fathoms; and depths of over 2,000 fathoms are found almost if not quite in sight of most of the islands along the outside of the Bahamas, and even in the narrow passages between them. In one place the 2,000-fathom curve was found to approach the shore to within two miles and a half, giving an inclination of the bottom of over 38 degrees.

Not the least gratifying point of interest of this cruise was the successful sounding taken at the enormous depth of 4,561 fathoms, which, it is believed, is the greatest depth from which bottom specimens and temperature have been obtained.

The soundings shown on the sketch represent but a small part of the work performed by the officers of the Blake, as only the characteristic ones have been selected from a total of nearly 2,000. During the time actually engaged in sounding, the Blake has steamed over 7,000 miles, and probably as much more in going to the working-ground, and in gaining positions after being obliged to abandon them from heavy weather, want of coal, or from other causes.

Bottom-soil specimens have been saved for examination, and densities of the sea-water obtained at nearly all the greater depths. About 1,200 surface temperatures have been taken; and the observations of the temperature of the water between the surface and the bottom will number about 1,300.

THE PROTOZOAN PARASITES OF THE OYSTER.

M. CERTES has recently described the protozoan parasites or commensals of *Ostrea edulis* and *angulata*, resorting to a method used by the writer in studying the contents of the stomach of the *O. virginica* during the past summer. A pipette is introduced through the mouth of the animal into its stomach. After it is filled with the brownish, dirty-looking contents of the gastric cavity, the pipette is withdrawn, and emptied upon a slide or compressor, and the material carefully examined under the microscope, in order to learn the nature of the bill of fare of the animal, and to detect the presence of endoparasitic organisms. As found by the writer in the American oyster, *M. Certes* states that the oyster is omnivorous. Amongst the contents of the stomach, more or less disorganized, grains of pollen, mites, algae, crustaceans, diatoms, foraminifera, radiolarians, and, at certain times of the year, a

great abundance of eggs and spermatozoa, were noticed by the above-mentioned observer. Amongst this *débris*, however, certain living organisms are always met with, often in great numbers, which may be regarded as parasites, or at least as commensals, inhabiting the digestive canal of the animal.

In the stomachs of specimens of *O. edulis*, from Cancale and Marennes, the author discovered *Hexamita inflata* Duj., which was also observed in the act of division in this unusual position; and, as it is also found in infusions and stagnant water, it is proved that it is a true commensal under certain circumstances.

Another organism was observed amongst the contents of the stomach, principally at its anterior part, which might at first be regarded as a *Spirillum* of relatively large size. It varied in length from 0.04 to 0.12 mm., and in thickness, from 0.001 to 0.003 mm. It was found to have a vibratile frill attached, which was arranged spirally on the body, making two, three, rarely eight or ten, turns around it. This thin vibratile film was demonstrated in the living specimens by the use of aniline colors, dahlia, and methyle blue, and also by killing the creatures with the fumes of osmic acid, and afterwards staining with the colors named. M. Certes regards this organism as related to *Trypanosoma sanguinis*,—described and figured in 1843 by Gruber as a parasite of the blood of the frog, and rediscovered by Ray Lankester, and named *Undulina ranarum*,—and *Trypanosoma Eberthii* of Saville Kent, found in the intestine of the duck. For the parasite found in the oyster, M. Certes proposes the name of *Trypanosoma Balbianii*.

Besides the foregoing, a small species of *Euchelyodon* was found in the liquor which had been kept covered for some days from Marennes oysters, as well as in the fresh juices which escaped when the shell was opened. *Prorocentrum micans* Ehr. was also noticed. A plate containing twelve figures accompanies the paper noticed (*Bull. soc. zool. France*, vii. 1882).

The organism which M. Certes has described as *Trypanosoma Balbianii* is probably the same as that commonly met with in the stomach of *Ostrea virginica*, and which I had proposed to call *Spirillum ostrearum* in a paper prepared last September for the census report. Its behavior was so like that of a *Spirillum* which I have at times found in the foul, stagnant waters of the gutters in the streets of towns, that it seemed to me that it was a vegetable organism belonging to the schizomycetous fungi. The French naturalist is probably right,

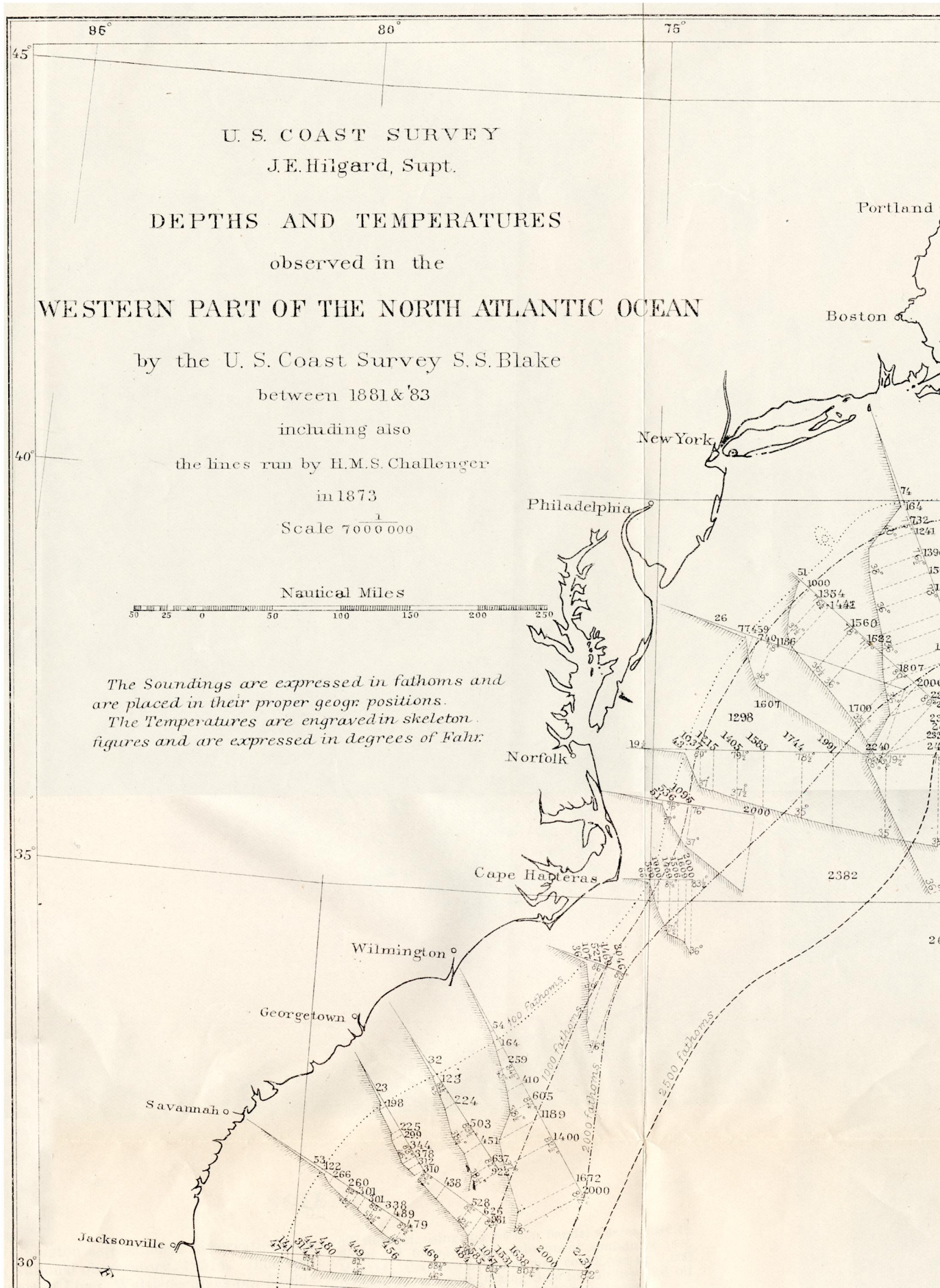
however, as to its systematic position, unless the form found in *Ostrea virginica* is entirely different, which I think altogether unlikely. Sachs (Text-book of botany, 2d ed., 1882, p. 248) says, "The Schizomycetes live in fluids which contain organic substances (albuminoids) liable to putrefaction, from which they obtain their nutriment, and of the putrefaction of which they are the cause." While it is hardly fair to say that putridity characterizes the contents of the alimentary canal of the oyster, yet the conditions favorable to the growth and multiplication of low organic forms are probably present. We usually found this organism present in oysters examined by us: in fact, sometimes countless multitudes were present, especially in the stomach and around the crystalline style and the intestinal pouch or fold in which the latter is lodged. Yet, upon eating these same individuals known to be infested with parasites, no inconvenience was experienced, showing that these organisms, whatever they may be, are probably harmless to man.

I have alluded to a singular association of messmates, found inhabiting the cavity of the mantle of the American oyster, in my report to the Maryland commissioner for 1881 (Appendix A, pp. 24-25). The little oyster-crab *Pinnotheres ostreum* Say was found to support colonies of the vorticellid *Zoothamnium* on its back and legs. The infusorian, in its turn, supported on its stalks very minute Bacteria and Vibriones. In such a case, the colonies of infusorians may be of actual benefit to the oyster, since many of the zooids thrown off doubtless become food for the host.

J. A. RYDER.

THE USE OF STEEL SOUNDING-WIRE
BY LIEUT. J. C. WALSH, U.S.N., ON
THE TANEY, IN 1849-50.

Two notes on this subject have been published by Mr. W. H. Dall in SCIENCE (No. 3, p. 65; and No. 7, p. 191). In these, Mr. Dall refers to the log-book of Lieut. Walsh, when in command of the Taney, as if it were still unpublished. Nor does he give any references to the detailed report of the expedition, made by Lieut. Walsh to Lieut. Maury, as ordered by the secretary of the navy. This report was dated Aug. 15, 1850, and was printed in 1851 in connection with the 'Abstract log of the Taney,' which includes all the observations in tabular form, with a column of remarks, as a part of 'Lieut. Maury's Investigations of the winds and currents of the sea,' Appendix to



U. S. COAST SURVEY

J.E. Hilgard, Supt.

DEPTHS AND TEMPERATURES

observed in the

WESTERN PART OF THE NORTH ATLANTIC OCEAN

by the U. S. Coast Survey S.S. Blake

between 1881 & '83

including also

the lines run by H.M.S. Challenger

in 1873

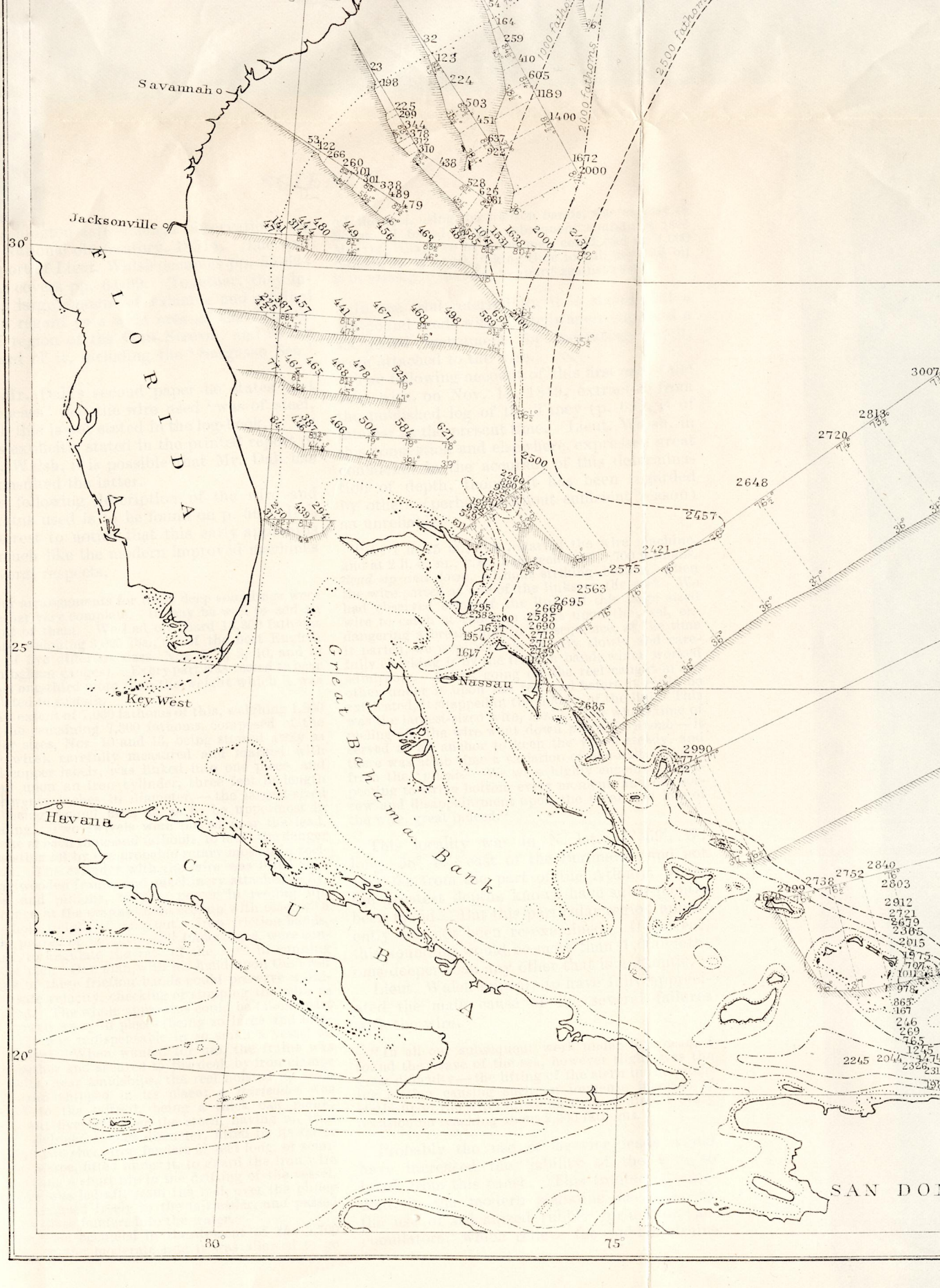
Scale 7000 000

Nautical Miles

The Soundings are expressed in fathoms and are placed in their proper geogr. positions.

The Temperatures are engraved in skeleton figures and are expressed in degrees of Fahr.







the Washington astronomical observations for 1846 (National observatory, 1851). The special report of Lieut. Walsh occupies pp. 55-62; the log covers pp. 64-99. Together, they include a large amount of valuable and original data in regard to a wide area of the Atlantic in the region of the Gulf Stream, and to the eastward of it, including the 'Sargasso Sea,' etc.

In Mr. Dall's second paper he states that 'it appears' that the wire used 'was of steel, though this is not stated in the log-book.' As this is explicitly stated in the printed report of Lieut. Walsh, it is possible that Mr. Dall has not consulted the latter.

The following description of the wire and apparatus used is to be found on p. 56. It is of interest to notice that this early apparatus was much like the modern improved machines in several respects.

"Our arrangements for these deep soundings were altogether very complete. It may be well to add an account of them. We had on board 14,300 fathoms of wire, weighing 3,025 lbs., all of the best English steel, of five different sizes, Nos. 5, 7, 8, 10, and 13 (Birmingham gauges). Every part was tested to bear at least one-third more than the weight which it was calculated to sustain.

"An extent of 7,000 fathoms of this, weighing 1,800 lbs. (the remaining 7,300 fathoms, composed of the smaller sizes, Nos. 10 and 13, being stowed away as spare wire), carefully measured and marked with small copper labels, was linked into one piece, and wound upon an iron cylinder, three feet in length and twenty inches in diameter, — the largest-sized wire being wound first, so as to be uppermost in sounding. Two swivels were placed near the lead, and one at each thousand fathoms, to meet the danger of twisting off by the probable rotary motion in reeling up. The cylinder with the wire was fitted to a strong wooden frame, and machinery attached — fly-wheel and pinions, to give power in reeling up. Four men at the cranks could reel up with ease, with the whole weight of wire out. Iron friction bands, which proved of indispensable importance, were connected to regulate the rate of the wire in running off the reel. One man with his hand upon the lever of one of these friction bands could preserve a uniform, safe velocity, checking or stopping the wire as required. The whole apparatus could be taken apart and stowed away in pieces (being so large and massive, this was indispensable in so small a vessel as the Taney). When wanted for use, the frame was put together and secured to the deck by iron clamps and bolts, near amidships, the reel hoisted up from below and shipped in its place; a *fairleader* was secured to the taffrail, being a thick oak plank, rigged out five feet over the stern, having an iron pulley, eighteen inches diameter, fitted in its outer end, and two sheet iron fenders $3\frac{1}{2}$ feet long, of semi-circular shape, fitted under it, to guard the iron wire from getting a short nip in the drifting of the vessel. The wire was led aft, from the reel, over the pulley which traversed freely in the fairleader, and passed between these fenders into the water.

"The time occupied in the descent of the 5,700 fathoms, at the moderate rate it was allowed to go

off the reel, using the friction bands, was exactly $1\frac{1}{2}$ hours. I found in the subsequent soundings [see May 14], that two or three men could reel up 1,000 fathoms in $2\frac{1}{2}$ hours, taking time to rub dry and oil it in passing to the reel, to guard against rust."

In the trial referred to, it is stated that a ten-pound lead, with a Stellwagen cup, and a six-pound instrument for indicating depth, were attached to the wire.

The following account of this first use of the steel wire, on Nov. 14, 1849, extracted from the published log of the Taney (p. 69), is of interest at the present time. Lieut. Walsh, in this connection and elsewhere, expressed great confidence in the accuracy of this determination of depth, though it has been regarded by others (perhaps without sufficient reason) as unreliable.

"At 1 h. 25 m., P.M., started the wire machine, and at 2 h. 55 m., P.M., had reeled off 5,700 fathoms, *dead up and down*, without striking bottom, when the wire parted at one of the links on the reel. We had observed some of the links of this large sized wire to catch at times on others upon the reel, endangering a break, and in consequence, at the time it parted, we were reeling off very slowly and carefully checking it by the friction band, which worked admirably. A link going off the reel caught in another under it upon the reel and before it could be extricated, it snapped in the middle of the link. This was the largest-sized wire, No. 7. The whole time of reeling off, the wire went down *perfectly plumb* — it served as an anchor to keep the vessel steady, and there was at no time a variation of one-half a degree from the '*plumb*.' We were highly encouraged, expecting to strike bottom every moment, and our sorrow and disappointment upon the break and loss of the wire, great indeed."

This locality was in N. lat. $31^{\circ} 59'$, W. long. $58^{\circ} 43'$, east of the Bermudas, and not very far from the part of the Atlantic where the greatest depths known have subsequently been found. But this particular region apparently has not been re-examined. If correct, this sounding would be more than 1,000 fathoms deeper than any other that is authentic.

Lieut. Walsh appears to have fully appreciated the main cause of the several failures with the wire.

"In all our subsequent work under this head, I found the heave of the sea, however slight, was the great difficulty — the lifting of the stern in the pitching motion causing such an immense increase of strain upon the wire, breaking it upon almost every occasion on reaching about 2,000 fathoms."

Probably the use of heavier leads would have increased the liability of the wire to break from this cause. This trouble is remedied, in the modern sounding-machines, by the use of vulcanized rubber springs or 'accumulators,' which relieve the sudden strains

upon the wire. Therefore there is no good reason to think that any thing would have been gained at that time by the use of heavy leads, though Mr. Dall thinks it strange that they were not tried. In some of the trials a twelve-pound lead was used, and, in the last attempt, one of eight pounds, together with a thermometer, with the usual result, — a breakage of the wire.

Mr. Dall's note implies that no successful trials were made with the steel wire; but, according to the *published* log (p. 93, May 14, 1850), at least *one* sounding was made (1,050 fathoms, no bottom) when the wire was successfully recovered.

A. E. VERRILL.

LAKE BONNEVILLE.

MR. G. K. GILBERT's report (*Ann. rep. U. S. geol. surv.*, 1881, 169), preliminary to the monograph (in preparation) he promises on the Great Basin, shows the following history for its old lake. The lake-deposits are chiefly a yellow clay of unknown depth, covered by a white marl ten to twenty feet thick, the two being separated at certain points along the old shore-lines by wedges of subaerial gravel-deposits, and some exposures showing erosion of the clay surface before the marl was laid on it. These deposits mark two periods of high water, separated by a time of low water, or dryness. As no cause is found in the surrounding country to account for the change from clay to marl deposit, its explanation is sought in a change from salt water of the first lake period to fresh water in the second, for which a theoretic explanation is given; but the evidence for this is not considered final. From a critical study of the superposition of many shore terraces (see the plate opposite), it is shown that the first lake did not rise high enough to reach an overflow outlet; that the greater number of terraces now visible were formed during halts in the rise of the second great lake; that the highest or Bonneville terrace, nine hundred or more feet above the present Great Salt Lake, marks a stand at the level of overflow northward to Snake River; that the next most pronounced terrace, known as the Provo, four hundred feet lower, marks a halt in the drainage of the waters when the outlet had been cut down through softer rocks to a hard limestone sill. The reduction of the lake-surface to a still lower level, as in the present shallow sheet of water, has been effected entirely by climatic change, by which the ratio of precipitation to evaporation has been decreased. When at its highest level, Lake Bonneville was three hundred miles long between latitudes $37^{\circ} 40'$ and $42^{\circ} 20'$, and one hundred and seventy miles broad between the meridians $111^{\circ} 35'$ and $114^{\circ} 15'$ of west longitude. Its shore-line was very irregular, advancing around broken promontories, and retreating into fiord-like bays. Numerous islands stood above its broad, deep, fresh waters, and from its shores the enclosing mountains rose five to eight thousand feet. Now it is represented by a mere film of brine on the borders of a desert plain. Previous to the rise of the first lake, the base-level of the basin drainage was low for a long period, as is proved by the distinct overlap of the lacustrine deposits on the eroded mountain-slopes, as shown in the second plate here copied on p. 573, or on the alluvial cones built

by old streams flowing from the mountain valleys; but the conclusion that this long period had a dry climate is not fully proved. For if, as is mentioned below, a considerable tilting has already deformed the recently made Bonneville terrace, one may fairly suppose a much greater distortion in the long time since the beginning of the first lake; and this distortion may have been sufficient to raise a barrier behind which the lake-waters accumulated. The change from the prelacustrine condition would then have been orographic rather than climatic. The relation of the glaciation of the neighboring ranges to the lakes is not shown directly, although three old moraines are found within the terrace limits; for none of these give good opportunity for observation, and the one at the mouth of Little Cottonwood cañon is so dislocated by recent faulting that its attitude with relation to the terraces cannot be deciphered. Recent discoveries by Mr. I. C. Russell in the western part of the Great Basin may throw further light on this question. Volcanic eruption took place in the basin during the disappearance of Lake Bonneville; and both the Bonneville and Provo terraces have been warped from their originally level plains, and by different amounts. From measures taken along the eastern shore-lines, lines of equal deformation are constructed; and these show very clearly a relative elevation of the centre, or south-western part, of the old lake-bottom of as much as three hundred feet since the Bonneville terrace was made, and a hundred and twenty-six since the Provo. This tilting accounts for the eccentric position of the present shallow lake-remnant at the north-eastern margin of its flat desert. A fault of fifty to seventy-five feet has been made along the foot of the Wahsatch range, between Willard and Levan, since the lake lost its outlet. The author therefore concludes that volcanic activity and mountain growth have not yet ceased in this neighborhood.

Special interest is attached to this investigation, as it is the first detailed study of an example of those great interior lakes so numerous at a comparatively recent period of the earth's history, and now so greatly reduced in area, or even converted into saline or sandy deserts. The largest of these was probably the one that united the Aral and the Caspian; another vast interior sea occupied much of what is now the desert of Gobi; and smaller examples could be named in the Argentine Republic and in northern Mexico. Central Africa, lying within the belt of heavy equatorial rains, still preserves a climate moist enough to fill its lakes to overflowing; but the recent drying-up of the outlet of Tanganyika shows that the change so distinct elsewhere is beginning to make itself felt even there. It will be long before any of these other great basins is known as well as that one so carefully studied by our government surveyors.

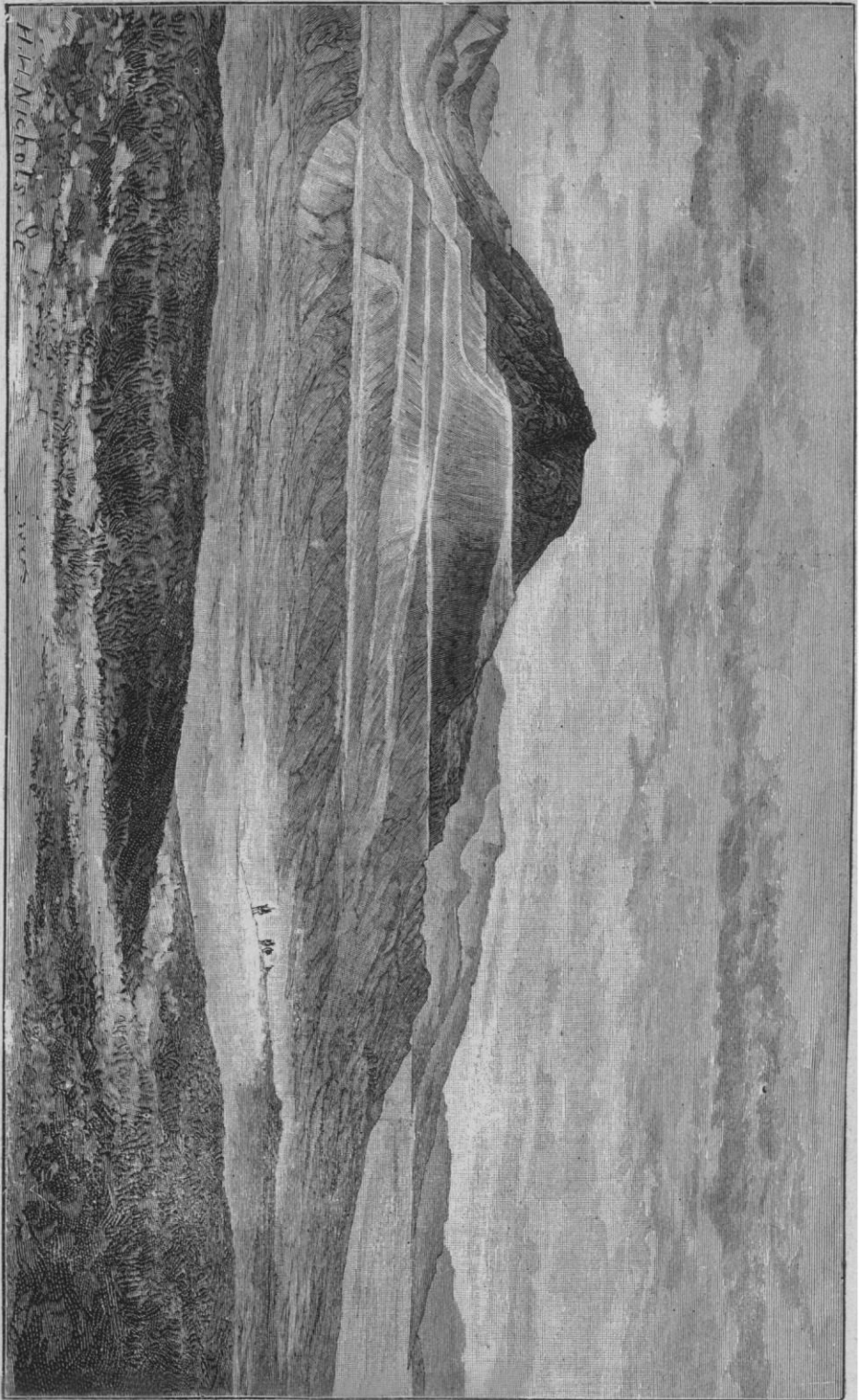
W. M. DAVIS.

CHEMICAL AND PHYSIOLOGICAL RESEARCHES ON THE PTOMAINES.

DURING the last few years much attention has been directed to the study of the chemical nature and physiological action of the so-called *post-mortem* alkaloids (or ptomaines). These mysterious bodies, which are apparently formed in such small quantities as to make their detection and separation an extremely difficult operation, were originally regarded by both Selmi¹ and Schwanert² (1874) as exclusively

¹ Abstract in *Berichte deutsch. chem. gesellsch.*, vi. 142.

² *Berichte deutsch. chem. gesellsch.*, vii. 1332.



RESERVOIR BUTTE, SHOWING TERRACES OF THE BONNEVILLE SHORELINES.

products of cadaveric putrefaction. Later, Selmi saw cause to believe that these organic bases, in serious pathological changes, might be produced in the animal organism during life, a view which was confirmed by Spica in 1881. Further experiments by Paternò and Spica on blood and egg albumen, and likewise those of Gautier on normal urine, showed, that, by the methods employed, reactions could be obtained from these healthy animal fluids similar to those which served to identify the ptomaines. Again: in 1881 Gautier communicated the discovery of a non-peptoid, ptomaine-like alkaloid, with poisonous properties, in normal human saliva, not destroyed by heat, and yielding crystalline gold and platinum compounds. Bujwid,¹ however, has tried physiological experiments on frogs and pigeons with the concentrated alcohol-water extract from 100 cc. of boiled saliva, and could obtain no poisonous action whatever. Griffin,² while endeavoring to explain Vulpian's results on the toxic action of human saliva, came to the following conclusions from injection experiments on rabbits: pure parotid saliva produces neither local nor general pathological changes when injected subcutaneously; filtered mixed saliva, containing, however, recognizable microphytes, produces no local effect, but causes an infection which finally becomes fatal; impure saliva of the mouth, collected while fasting, and injected under the skin, produces both a violent local action and a septic-like infection. The infection obtained in all of the experiments Griffin considers as a form of septicaemia, produced by a substance in solution in the saliva, and not due to microphytes. The local effects, however, produced by the impure mixed saliva, are not to be ascribed to either of the above, but to the partially putrid substances suspended in the fluid. These, when injected, are retained by the subcutaneous tissue, and thus give rise to irritation, finally producing gangrene; and, at the same time undergoing further decomposition, new putrid products are formed, which are absorbed, thus giving rise to a secondary infection. Coppola,³ in a similar manner, has made a series of experiments on the physiological action of bases extracted from the blood of a healthy dog, which led him to believe that bodies extracted from healthy animal fluids, carefully protected from putrefactive alteration, may exhibit strong toxic properties, and therefore the albuminoid substances must be capable of undergoing certain transformations, aside from those produced by putrefaction, which may give rise to poisonous alkaloids. This view is in part substantiated by the recently published results of Brieger,⁴ who found, that, by the digestion of raw fibrine with gastric juice, peptones are formed, which, although free from all products of putrefaction (indol, phenol, oxyacids, etc.), yield to alcohol and amyl alcohol an amorphous brown mass, which, even in small quantities, acts as a poison upon frogs and rabbits. .05-.1 gram of the sirupy extract was sufficient to kill a frog in fifteen to twenty minutes; while, with rabbits of one kilogram weight, .5-1 gram of the extract was required to produce the same effect by subcutaneous injection. The poisonous action is first manifested in a gradual paralysis of the extremities; after which the animal falls into a semi-comatose condition, and soon dies. The substance or substances formed in this manner react with all of the general alkaloid reagents, and are not readily decomposed by long boiling, nor by the long-continued

action of hydrogen sulphide. Length of time, in the digestion of the fibrine, appears to exercise but little influence on the amount of the toxic substance formed. The same product was also obtained, in one case, from von Wittich's dry peptone. The poisonous substance does not come from the amyl alcohol, nor from the gastric juice; neither does undigested albumen yield any poisonous substance when extracted with amyl alcohol. Brieger's results thus confirm the previous statements of Schmidt-Mülheim, Hoffmeister, Fano, and others, that peptones, injected into the blood or under the skin, exert a poisonous action, though it would now appear that the action is not due to the peptones themselves, but to a substance formed simultaneously with them, and which can be partially separated by ethyl and amyl alcohol. Just here it is worth noticing the recent interesting discovery of Mitchell and Reichert, that the poisonous action of rattlesnake and moccasin venom is due to the presence of two albuminous bodies, which, from their properties, they name *venom-peptone* and *venom-globulin*. Brieger also saw cause to believe that neurin, by oxidation, is changed into a body similar to, if not identical with, the extremely poisonous muscarin; also that a solution of neurin, on long standing in contact with air, is partially changed into poisonous products, which, by further putrefactive decomposition, disappear with formation of trimethylamine, and a substance volatilized when boiled with water.

It would thus appear that healthy animal fluids may contain substances capable of poisonous action, and also that albuminous matter may undergo changes other than putrefaction by which toxic substances may result; all of which tends to throw a shadow of doubt on the existence of distinctive *post-mortem* alkaloids. That poisonous bodies (or ptomaines) do result from the putrefaction of organic matter, there can, however, be but little question; and the recent work of Guareschi and Mosso,¹ of the university of Turin, is, in this connection, well worthy of notice. These investigators have made a systematic study of the products of the putrefaction of brain, blood, and fibrine, under varying conditions, and have fully established the formation of one or more poisonous alkaloids.

As preliminary to the actual work, a careful examination was made of the methods more commonly used for the extraction of ptomaines, in which it was found that the common extractives employed may contain traces of alkaloid substances. Thus, by the evaporation of large quantities of alcohol (fifty litres) in the presence of tartaric acid, a small residue was obtained, giving the alkaloid reactions with chloride of gold, phospho-molybdic acid, etc., and containing a trace of an alkaloid substance similar to pyridine, thus confirming the results of previous investigators; viz., Pinner, Krämer, and others.

In the amyl alcohol of commerce pyridine was likewise detected, in one case to the extent of 0.5 per thousand. Platinum and gold salts were made and analyzed. From six litres of crystallizable benzine a quantity of pyridine was also obtained sufficient to furnish chloroplatinates for analysis. The authors therefore conclude that all previous results obtained by different investigators from alkaline extracts by the use of either amyl alcohol or benzine, unless carefully purified, are absolutely without value as deciding the presence of ptomaine-like bodies in fresh tissue or fluids, or their formation in the putrefaction of such material.

In the search for ptomaines in putrescent brain-

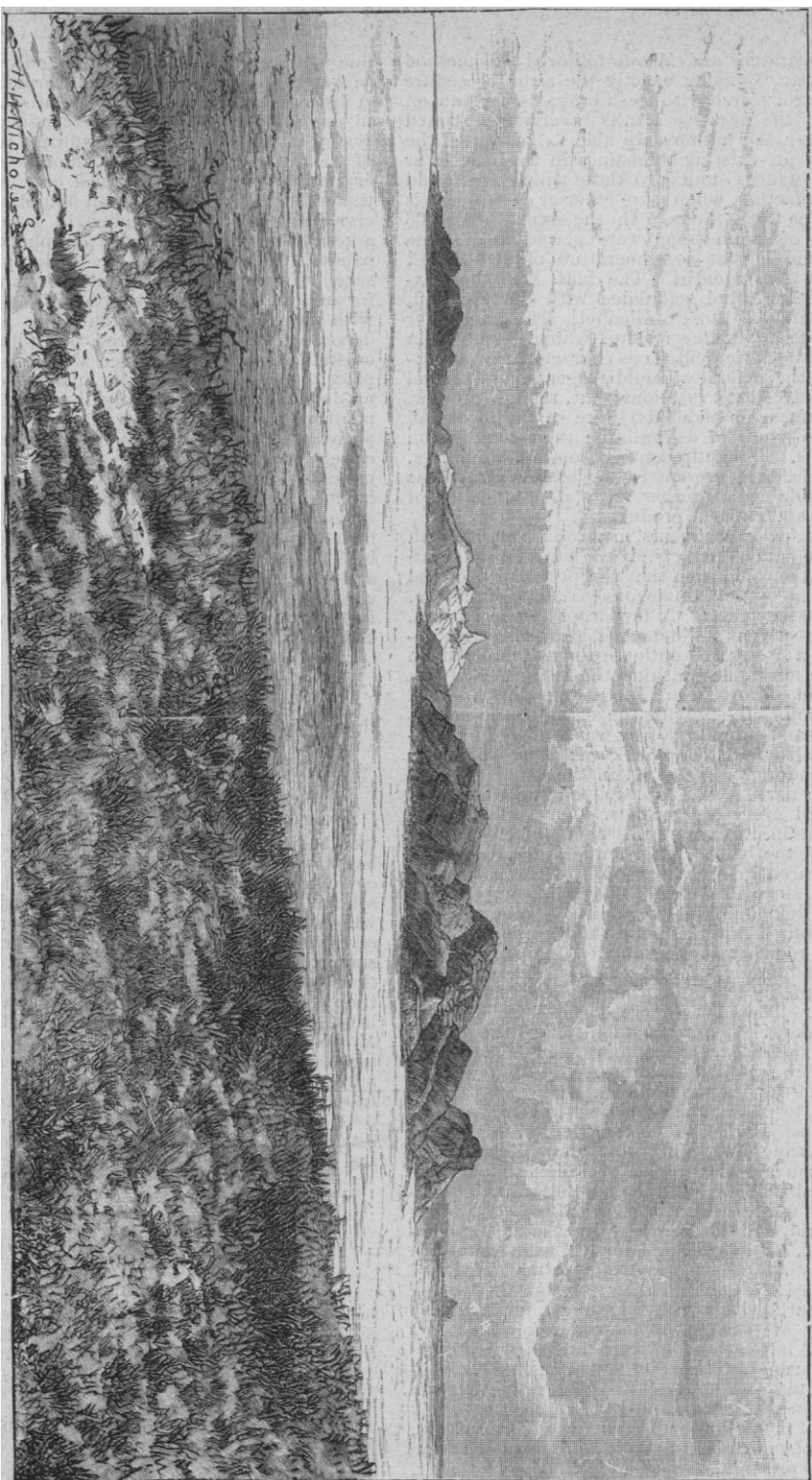
¹ *Virchow's archives*, xci. 190.

² *Archives ital. biol.*, ii. 106.

³ Abstract in *Journ. chem. soc.*, 1883, 523.

⁴ *Zeitschrift physiol. chem.*, vii. 274.

¹ *Archives ital. biol.*, ii. 367.



VIEW ON GREAT SALT LAKE DESERT, SHOWING MOUNTAINS HALF BURIED BY LAKE-SEDIMENTS. (See page 170.)

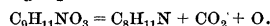
matter, Guareschi and Mosso followed the method of Stass-Otto, applying exactly the same procedure in the control search with fresh brain-tissue; and, on account of the negative results invariably obtained in the latter, the authors are able to guarantee the absence of pre-existing ptomaines in fresh flesh, or of any substances similar to those which are found after putrefaction, when pure ether or chloroform is used in the extractions. In the experiments, 36 kilograms of brain-tissue were placed in a glass balloon, and left at a temperature of 10° – 15° C. for one to two months. The mass was then extracted with alcohol acidulated with tartaric acid, using, in all, 147 litres of alcohol. The final ether solution left an alkaline residue, which, dissolved in dilute hydrochloric acid, gave characteristic precipitates with the general alkaloid reagents, and several well-defined colored reactions; but, though present, the ptomaines (or alkaloids) were in far too small quantity to admit of determining their composition by analysis. Trimethylamine, coming, doubtless, from the lecithin present in the brain-matter, was likewise obtained, together with an abundance of basic and ammoniacal products.

Physiological experiments, made on frogs with both aqueous and ether extracts, of the putrid brain-matter, led to the conclusion that the ptomaines formed possessed an action analogous to that of curare, though less energetic. A few drops of the extract, applied directly to the detached heart of a frog immersed in a .7 % salt solution, exercised upon it an immediate effect, diminishing the frequency of the systole and diastole, but increasing the vigor of the pulsation. In studying the action of the extract on nerves and muscles, a frog was rendered motionless by destroying the spinal cord; after which the achilles tendon was prepared in the usual manner, the sciatic nerve being placed upon the electrodes, and excited every ten seconds. .3 cc. of the ptomaine containing extract was then injected under the skin of the back. After ten minutes, an irregularity appeared in the contraction of the gastrocnemius; and, since all the conditions of the experiment remained the same, the irregularity is to be ascribed to the poison. From this point the contractions were no longer regular: they gradually diminished little by little, and finally ceased altogether. On increasing the force of the irritation, there was still no further movement. The sciatic nerve of the other side, intact, had likewise lost its excitability, and the animal was in as complete a state of muscular relaxation as if it had been poisoned by curare. But the pupil was dilated, and the heart motionless.

In order to obtain the ptomaines in larger quantities, recourse was had to blood-fibrine. Large quantities of fibrine (140 kilos) were allowed to putrefy for five months; at the end of which time it was transformed into a thick fluid holding a small quantity of solid matters in suspension; the reaction being strongly acid, and the odor very intense at the commencement, but less strong later. For the extraction of the alkaloids, the method of Gautier and Étard was followed; the final slightly alkaline fluid being extracted successively with chloroform, in all, twelve times. By evaporation of the chloroform, an oily residue was left with an odor of scatol and of pyridine (or cicutine). This residue was purified by solution in tartaric acid, decolorized by extracting the acid solution with ether, and then reprecipitated by an excess of potassium hydroxide in the form of oily, brown droplets, which quickly rose to the top of the fluid. This precipitate was readily dissolved by ether, and, on evaporation, was left as an oily, brown resi-

due with strong alkaline reaction, only slowly soluble in water, and then rapidly transformed into a resin. A hydrochlorate was readily obtained, crystallizing in fine lamellae, sometimes rectangular, resembling somewhat the crystals of cholesterol. With a solution of the hydrochlorate, auric chloride gave a yellow crystalline precipitate, followed by the reduction of the gold; platinic chloride, an abundant pale-yellow crystalline precipitate; iodine in potassium iodide, a kermes-brown precipitate; phosphotungstic acid, a pale-yellowish precipitate, etc. Chloroplatinates from seven different chloroform extractions were prepared for analysis by treating a solution of the hydrochlorate with an excess of platinic chloride. An immediate deposition of a flesh-colored precipitate, light and crystalline, insoluble in water, alcohol, and ether, took place. Dried at 100° C., the analyses of the various products showed essentially the same composition, pointing to the presence of only one ptomaine in this putrefaction. The results correspond more or less closely with the formula $(C_{10}H_{15}N \cdot HCl)_2PtCl_4$, the ptomaine itself being probably $C_{10}H_{15}N$. Bodies having the same apparent or closely related composition have been previously discovered: coridine, a homologue of pyridine, found in the oil of coal-tar by Thenius; a base, $C_{10}H_{15}N$, discovered by Vohl and Eulenberg in the fumes of tobacco, also termed coridine; a base obtained by Neucki¹ in the putrefaction of gelatine with pancreas, and which he deemed an isomer of collidine.

He² considered its constitution to be expressed by $C_6H_5 - CH \begin{smallmatrix} \diagup CH_3 \\ \diagdown NH_2 \end{smallmatrix}$, that is, isophenylethylamine, and that it is derived from the putrefaction of tyrosin, a normal product of pancreatic digestion, according to the following equation:—



Gautier and Étard,³ while studying the alkaloid-like bodies produced by putrefaction, isolated two bases, which, from the analyses of the platinum salts, corresponded to parvolin and hydrocollidin. Sonnenschein and Zuelzer⁴ obtained from flesh extracts, which had become putrid by standing at 25° C. for several weeks, a small quantity of a crystalline substance, which behaved similar to atropin, dilating the pupil of the eye, and increasing the pulsation of the heart, etc. There is also a noticeable similarity between the ptomaine obtained by Guareschi and Mosso, and the tetrahydromethylquinoline of Jackson. The physiological action of the alkaloid from putrefied fibrine is analogous to that of the ptomaine from putrid brain-matter. Guareschi and Mosso propose to experiment further in the hopes of better establishing the nature of the ptomaine in question, and to make clear its origin and constitution.

R. H. CHITTENDEN.

LETTERS TO THE EDITOR.

Precocity in a chicken.

A BRAHMA chicken—now five weeks old, and raised by my boy—was brought into the house two weeks ago with a broken leg. On the same day a weak chicken, just out of the egg, was also brought in; and after two or three days both chickens were

¹ Ueber die zersetzung der gelatine und des eiweisses bei der faulnis mit pankreas. Bern, 1876.

² Journ. prakt. chem., xxvi. 51.

³ Comptes rendus, xciv. 1298.

⁴ Berliner klinische wochenschrift, 1869, No. 2.

kept in a box together. The older chicken soon assumed the care of the little one, brooding it after its fashion, and pecking any disturbing hand. But the strangest feature is, that when a dainty morsel, such as a fly, is brought, it will call the little one like a mother-hen, and give it the fly to eat. This has been done repeatedly within the past week, the sound made being unmistakably the food-call, though, of course, pitched on a higher key. Yet it cannot have heard that sound for at least two weeks, and, in the ordinary course of events, should not make it for eight months.

REDDUCS.

Cambridge, June 6.

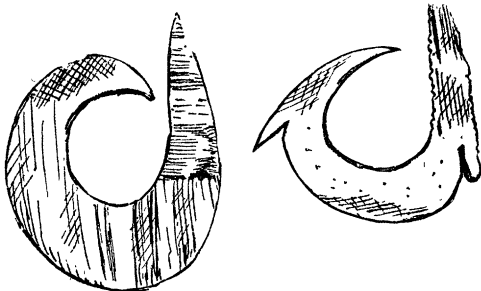
Lake Superior geology.

On reading Professor Chamberlain's paper in *SCIENCE*, No. 16, and afterwards referring to his statement in the third volume *Wisc. geol. reports* (p. 423), I see that I was mistaken regarding the Taylor's Falls locality being fifteen miles away from other traps (*SCIENCE*, No. 9). I now see that his language was not intended to be taken as it was understood by me.

M. E. WADSWORTH.

Fish-hooks from southern California.

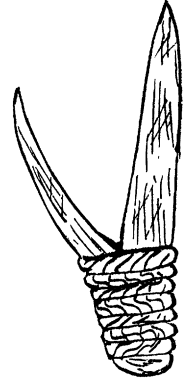
In plates xi. and xii. of Lieut. Wheeler's Report on archeology there are several drawings of ornaments found near Santa Barbara, Cal., and on the adjacent islands, by Mr. Paul Schumaker and myself, which the editors are pleased to call fish-hooks. A writer in the *Century magazine* for April presents drawings of other specimens of like character, found by myself in the same locality, and now deposited in the Smithsonian institution. I also have in my possession a series of these ornaments, but it would require a broad stretch of the imagination to believe that they were intended for fish-hooks.



SHELL ORNAMENT. BONE ORNAMENT, SIZE OF ORIGINAL.

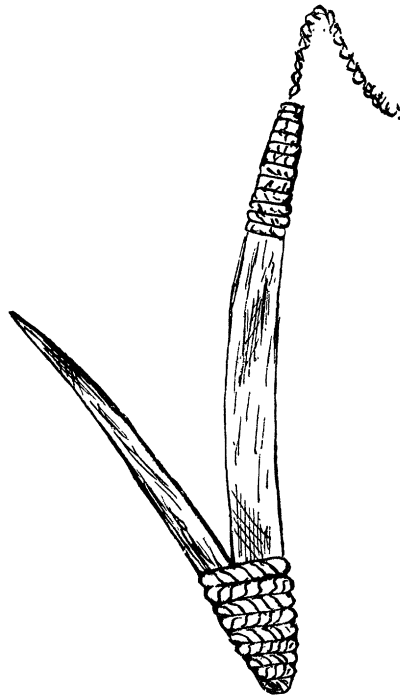
The point, which in many instances curves downward, comes so near the stem that it would be next to impossible for them to become hooked in a fish's mouth. The point of one of my best specimens, manufactured from the shell of the *Haliotis*, comes within the sixteenth of an inch of the stem or shank; and were a line to be looped on the stem, and cemented with asphaltum, as was practised by the California Indians, the space would be completely filled (see the annexed drawing). My specimens range in size from one-half inch to two and a half inches in diameter, and were manufactured from *Haliotis* shells and from bone. The first of these ornaments of which I have any knowledge, I found in a rancheria at Rincon, on the line between Santa Barbara and Ventura counties; and during five years' subsequent residence at Santa Barbara, and

the exploration of the mainland and islands, I had an opportunity to study them in every stage of development. I am convinced, that, with few exceptions, they were designed for ornaments, as their shape precludes the idea of their use as fish-hooks. They were probably suspended from the ears, and possibly worn on other portions of the body. The true fish-hook of what may be termed the Santa Barbara Indians has never, to my knowledge, been figured; yet they are more commonly met with in the rancherias and 'cementerias' in Santa Barbara and Ventura counties than the curved specimens we have been considering. I send you drawings of two specimens belonging to my cabinet. These hooks were made of two slightly curved pieces of bone pointed at each end, and firmly tied together at the lower end and cemented with asphaltum.



FISH-HOOK, SIZE OF ORIGINAL.

They are somewhat similar to those still in use by the South Sea Islanders. The larger specimen I found with a skeleton at Point Dume, Ventura county. There were several others similar to the



FISH-HOOK, SIZE OF ORIGINAL.

one figured still retaining the thong and cement that bound the parts together. The smaller specimen I found on the surface in a rancheria one mile west of the town of Ventura.

STEPHEN BOWERS.

Falls City, Neb., June 4, 1883.

Intelligence of the crow.

I find, by referring to my note-books, that I have witnessed several times the occurrence of crows breaking mussels by dropping them from considerable heights (SCIENCE, p. 513). In one instance, I had my field-glass with me, and made careful notes of what took place. The crows had assembled on Duck Island, in the Delaware River, and were busily engaged in running along the edges of the sand-bars, exposed at low tide. Every few moments, one of them would rise up to a height of fully fifty feet, carrying a mussel *in its beak*, and, flying inland to a distance of one hundred yards, would let the mollusk fall on the meadow. Usually the force of the fall was sufficient to break the shell. The crows, as soon as they had let fall their burden, immediately returned to the island and bars, and gathered more mussels. This was continued until the returning tide made mussel-hunting impracticable. In no instance did the crows carry the food they were gathering by their feet. There is one fact with reference to this habit of the crows which is, I think, indicative of greater intelligence than the mere fact of lifting an object and dropping it in order to break it. This is, that all the mussels so dropped were left undisturbed until the returning waters made further fishing impracticable, when the birds hastened to feast on the results of their intelligent labor. Marvellous as it may seem, these crows recognized the nature of tides, and, *knowing* their time was short, made as good use of it as possible.

If any more striking evidence of intelligence on the part of birds can be produced, let it be placed on record forthwith.

C. C. ABBOTT.

Impregnation in the turkey.

An interesting fact respecting our domestic turkey has recently come to my notice. A friend, finding that a stray turkey had recently come upon his premises with the intention of remaining, finally shut it up in his chicken-yard, where it was permanently confined with no other associates than the chickens. The prisoner at once began to lay eggs, and, after a nest was formed, sat upon them, hatching out, in the usual time, nine healthy turkeys. Three others, that had been hatched by a hen, died soon for want of care. The eggs, thirteen in all, were laid without any connection with a turkey-cock. An impregnation, then, that must have taken place before the fowl was placed in confinement, must have answered for all the eggs. Agassiz states that one copulation is supposed to answer for more than one egg in the case of the turkey, but adds that the supposition needs confirmation. The facts here mentioned seem conclusive, as there was no possible way in which connection could have taken place after the turkey was confined.

EDWARD M. SHEPARD.

Springfield, Mo.

THE GRAPE PHYLLOXERA IN FRANCE.

Compte rendu des travaux du service du Phylloxera. Année 1882. Procès verbaux de la session annuelle de la Commission supérieure du Phylloxera. Rapports et pièces annexes. Lois, décrets et arrêtés relatifs au Phylloxera. Paris, Impr. nat., 1883. 603 p. 4°.

THE *Compte rendu des travaux du service du Phylloxera* for the year 1882, just received in this country, makes a large volume, contain-

ing numerous reports of special committees and delegates. The *Commission supérieure du Phylloxera*, which consists of some thirty-seven members, including such well-known investigators as Dumas, Pasteur, Tisserand, Cornu, Balbiani, Marion, Marès, with a number of deputies and senators, was convoked by the minister of agriculture on the 19th of January, 1883. The first sub-committee at the session of Jan. 22 submitted its report, which was accepted by the *Commission supérieure*. This report may be thus summed up:—

After having passed upon 185 proposed remedies, they were unable to award the prize of 300,000 francs offered by the government in 1874, as they recognized in none of the new propositions any merit, whether as to novelty or more desirable methods of application of any insecticide already known. As in previous years, the substances most often recommended were salt, lime, soot, and cinders. It is well known that salt has produced nothing but bad effects on the vine, lime has amounted to little, while soot and cinders are but adjuncts to other modes of treatment. Among plants, Pyrethrum, tobacco, Quassia, and other similar products, are still urged by applicants for the prize, notwithstanding that the uselessness of such products has been shown by past experience. In fact, the proposed remedies range from dynamite and electricity to prayers and processions.

The second sub-committee reported through its chairman, M. Cornu, on the spread of the insect through France, the report being accompanied by a map which shows that nearly one-half of France is infested with Phylloxera. The map indicates particularly (1) the 'aronissements' in which the presence of Phylloxera has not yet been observed, and into which it is forbidden to introduce any vines from phylloxerated districts or from foreign countries; (2) districts in which the insect occurs quite generally, but into which the introduction of foreign vines, or vines from other phylloxerated districts, is not authorized; and (3) badly infested districts, into which the introduction of foreign and French vines from phylloxerated districts is authorized. These last constitute nearly one-third of the area of France.

It will be well for those, who, allured by the liberal offer of the French government, venture to propose a Phylloxera remedy, to remember that one of the absolute conditions for the awarding of the prize is that the remedy shall be based on positive and authentic experience. A great many visionary and theoretical propo-

sitions have been sent to us of late years with a request that we assist the proposers in presenting their claims to the French government. In almost every instance the proposers have shown an absolute lack of experience, both as to the insect and as to the methods they recommend.

The question of the winter egg, so called, has again occupied much of the attention of the commission, which places great confidence in the researches in regard to it of one of its eminent members, Balbiani, who has been instructed to continue his investigations. In reference to this egg, and the importance of destroying it, there has, of late, been much discussion in France; and we may repeat our answer to the following question, recently put to us by one of the first French investigators into the life-history of *Phylloxera*:—

"L'œuf soi-disant d'hiver de M. Balbiani est-il indispensable à la reproduction du Phylloxera, ou bien la reproduction agame vous paraît-elle possible durant plusieurs années ou même indéfiniment?"

Our reply was, that the impregnated egg (we prefer this term to 'winter egg') is indispensable to the continued reproduction of *Phylloxera*, and that normally it is produced annually in the cycle of the insect's life; but that agamic multiplication may, under favoring conditions, extend to the third or fourth year, and, for aught we know, longer.

In reading over Targioni-Tozzetti's criticism of Balbiani, and the latter's reply, in late numbers of the *Comptes rendus de l'académie*, we felt, that, so far as our own observations and experiments have gone, both were in a degree right, and both wrong. There is no question but that Balbiani is essentially right in his conclusion as to the necessity for the impregnated egg at some period during the annual development, under the conditions of our changing seasons. All the facts ascertained, as well as all analogy from what is known of the life-history of other species of the family, point to the accuracy of that conclusion. Yet experiments enough are on record to show, that, where the conditions of early spring and summer are artificially maintained, agamic reproduction in aphides may be greatly extended, and even go on to the third or fourth year.

Of course, this possibility of such continued agamic multiplication does not change the practical fact of what does take place in an ordinary year under ordinary seasonal changes. Balbiani, therefore, is theoretically quite right in insisting on the importance of the destruction of his winter egg. Just here, however, is

where we shall have to differ from him as to the practical value of attempts to do so, and for the following reasons:—

It is a universally conceded fact, that the species hibernates chiefly in the dormant larval state underground. Now, even supposing that every so-called winter egg could be destroyed, we know positively that the vines would still be infested, and that new impregnated eggs would again occur the ensuing fall or winter. Therefore, even on Balbiani's belief, these eggs would have to be annihilated for at least two consecutive years to do any good. But, unfortunately, all methods of annihilation heretofore proposed have proved impracticable, and, in fact, impossible.¹ Decortication must always be but partially successful, as the eggs are not confined to the loose bark or to the older portions of the vines. Moreover, our researches in this country (and it seems to us that experience in Europe corroborates them) show conclusively that this impregnated egg is not necessarily a winter egg, for it is extremely rare, and difficult to discover, during winter, or at any time: hence, and for the reason that larval hibernation prevails, we are justified in one or the other of the following conclusions:—

1°. That the sexual females do not necessarily confine the impregnated egg to the stems and branches, but lay them also at the base of the vine, or even beneath the ground; 2°. That hypogean, apterous females also produce the sexed individuals underground; 3°. That the impregnated egg hatches the same season that it is laid.

Now, there are certain facts of experience that would give some warrant to all three of these conclusions, the first and second being fully justified by facts recorded by Balbiani and ourselves. The third statement we have proved true with *Phylloxera* Rileyi; and M. P. Graels has also proved it for *P. vastatrix* in Spain (see *Amer. nat.*, 1881, p. 483).

Thus we have little faith in the results of decortication; and we have already expressed much the same views in the *American naturalist*, in our eighth Missouri report, and in our report to the Department of agriculture for 1878, p. 83.

With regard to the use of American vines as stocks on which to graft the more susceptible French vines, the commission admits the success of the former in rich or deep soils, but concludes that they leave something yet to be

¹ The eggs, in the rare cases where they are found, are concealed as much as possible in minute cracks and crevices, so that mechanical decortication cannot well reach them all; while the application of heat, as by torches, would not destroy them all unless intense enough to injure the vines.

desired on light or superficial soils. It seems to us that this amounts to little more than saying that a vigorous vine cannot be grown on a poor soil; the fact being that the American vines for this particular purpose have made their way against much opposition, and remain to-day the best solution, all things considered, of the Phylloxera question.

The commission finally concluded that the prize of 300,000 francs be still reserved, but maintained. It seems to us that some disposition should be made of this prize, as the commission must not expect to get any more satisfactory means of dealing with the pest than those already proposed, that are based on experience and sound scientific principles. By this we mean that the treatment of any such underground pest that has so varied a life-history must necessarily involve a given amount of time, money, and labor, regardless of the particular substance or means employed; and to look for a 'remedy' that shall involve neither is to look for the impossible, — the miraculous. Those who were the first to suggest and prove the value of resistant American vines, those who established the value of submersion and bisulphide of carbon, and those who have helped toward a sound knowledge of the insect's life-history, — all deserve recognition.

The methods recommended by the commission for the year 1883, aside from the use of the American vines, are the old ones of submersion, bisulphide of carbon, and sulphocarbonate of potassium.

C. V. RILEY.

CALIFORNIA AGRICULTURE.

University of California. College of agriculture. Report of the professor in charge to the president, being a part of the report of the regents of the university. 1882. Sacramento, State, 1883. 179 p. 8°.

THIS report includes the general report of the professor in charge, E. W. Hilgard, to the president, and four appendices, or special reports: viz., report and discussion of work in the agricultural laboratory, by E. W. Hilgard; report on instruction given, and culture experiments, by Charles H. Dwinelle; report of W. G. Klee, gardener in charge of the experimental grounds, on fruit and miscellaneous cultures; report of work done in the viticultural laboratory, with record and discussion of results, by F. W. Morse.

In his general report, Professor Hilgard reiterates the opinion which he has advanced in another publication (*Atlantic monthly*, April

and May, 1882), that, in view of the present wide-spread indifference to agricultural education, "the work of an experiment-station . . . is the key to the situation, so far as the utility and public appreciation of the College of agriculture is concerned." In accordance with this view, work appropriate to an experiment-station has been carried on, in addition to the work of instruction, to as great an extent as the time and means at command permitted; and the four appendices to the general report contain the results of the investigations which have been made.

The work of the agricultural laboratory has consisted chiefly of an examination of the more important and widely distributed soils of the state. These are classified geographically; and chemical and mechanical analyses of several representative samples of each class have been made, from the results of which very important conclusions are drawn as to the present and prospective value and the proper treatment of these soils. Professor Hilgard is far from falling into the old erroneous belief that chemical analysis can be depended upon to show the immediate deficiencies of a soil; but he holds that it may furnish important information as to the amount and kind of reserve matters which it contains, and afford a guide to a rational method of cultivation; and in his hands it certainly seems to justify the claims made for it.

One of the most interesting portions of the horticultural report in appendix III. is that devoted to the vineyard, where are given the results of experiments on grafting the European grape (*Vitis vinifera*) upon a native Californian species (*Vitis californica*). The conclusion is reached, that "it must be considered definitely proved that the *Vitis californica* is well adapted as a grafting stock for a large number of the varieties of *Vitis vinifera*." The importance of this fact, of course, lies in the greater power of resistance to Phylloxera possessed by the American species. Experiments upon the latter point are now in progress with grafted specimens.

The account of the viticultural work includes some observations on the occurrence and development of Phylloxera, but is chiefly occupied with the results of the experiments on wine-making, which, though still incomplete, and though necessarily executed on a small scale, furnish much valuable information as to the character of the wine to be obtained from different varieties of grapes, and from grapes grown in different regions of the state. They can hardly fail, if continued, to exert a most

beneficial influence on the advance of this industry in California, and may fulfil the hopes of their authors by leading to the establishment of definite and reliable brands of California wines.

The whole report, while dealing largely with

questions of local interest, affords at the same time an admirable illustration of the advantage accruing to agriculture from the application of high scientific attainments to the investigation of its problems.

WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

ASTRONOMY.

Semi-diameter of the moon.—Professor H. M. Paul, formerly assistant at the U. S. naval observatory, gives the results of two occultations of the *Pleiades* group by the moon, observed by himself to determine the *occultation semi-diameter of the moon*, and also the corrections to the right ascension, declination, and parallax of the moon, these being necessarily involved with the semi-diameter. The occultations occurred on July 6, 1877, and Sept. 6, 1879, and were observed with the 9.6-inch equatorial at the Washington observatory. The relative positions adopted for the stars were those of Wolf with proper motions from comparison with Bessel, and the general proper motion of the group as given by Newcomb. The observations of 1877 were poorly placed for a determination of the correction to the semi-diameter, but those of 1879 give a much more reliable result. From the latter (fourteen in all), the resulting correction to Hansen's mean semi-diameter ($15' 33''.47$) is $-1'.69 \pm 0''.12$; and the resulting value is, therefore, *semi-diameter* = $15' 1''.78 \pm 0''.12$. He gives also the results of Airy's determination from two hundred and ninety-six scattered observations, from 1830 to 1860. From the immersions and emersions at the dark limb, the resulting values are larger by $0''.9$ and $0''.5$ than those given by Paul, and, from immersions and emersions at the bright limb, Airy's results are larger by $2''.3$ and $4''.4$; while the probable error of a single observation and of the final result is in all cases greatly in excess of those obtained by Paul. Mr. Paul concludes that the best way to observe the actual occultation at the bright limb is to use as high a magnifying power as possible, so as to obtain a decided difference of color between the star and the moon's limb. Neither set of occultations observed by Paul gives any evidence of deviation of the moon's limb from a perfect circle. — (*Rep. Wash. obs., 1879, appendix ii.*) M. MEN. [1103]

ENGINEERING.

Swelled rifle-barrels.—A board of officers, with Capt. Greer as president, has tested a lot of rifles at the Springfield armory to determine the cause of the bulging of the barrel, which occasionally occurs in practice. They find it due to the fact that the muzzle has been stopped by sand, caused by resting the muzzle in wet sand, or in dry sand after the gun has become foul from firing. This arrests the passage of the ball, so that the pressure is increased at the point of swelling. It is curious that sand produced this result where wooden plugs, driven in tightly and swelled by steam, failed to do so. — (*Ord. notes, U.S.A., no. 238, Feb. 1.*) C. E. M. [1104]

Strength of explosives.—Gen. Abbot has extended his investigations to tonite, California gun-cotton, and rackarock. The first consists of 52.5 parts of gun-cotton and 47.5 parts of barium nitrate. The second is gun-cotton pulverized, and containing 24

per cent of moisture. The dry gun-cotton analyzed 89.6 per cent insoluble trinitrocellulose and 10.4 per cent soluble gun-cotton. This is 7 per cent above the standard required by the British government. The rackarock is composed of potassium chlorate and nitrobenzol. The substances are kept separate until needed for use, when the chlorate is dipped in the liquid until it has absorbed enough of it. Gen. Abbot found the relative efficiency in a horizontal plane for tonite, as compared with dynamite No. 1, to be 0.81 for the dry compressed state, and 0.85 for the damp uncompressed state, or 0.83 as the average value. It thus stands just below gun-cotton (0.87). Rackarock gives 0.86. The California gun-cotton was found equal to the best English. In a note, he calls attention to the spontaneous decomposition of explosive gelatine into cellulose and free nitro-glycerine, with the evolution of nitrous fumes, while in store during the winter and spring. — (*Prof. papers corps eng., U.S.A., no. 23, add. i.*) C. E. M. [1105]

Composition of steel.—Professor Abel has continued his researches on steel; and his experiments with cold-rolled steel of a *particular composition* confirm the view that the carbon exists in it in the form of a carbide which has the formula Fe_3C , or some multiple of that formula. Whether this carbide varies in composition in different descriptions of steel which are in the same condition of preparation remains to be demonstrated; but the preliminary experiments with small specimens of cold-rolled, annealed, or hardened steel, appeared to warrant the belief that the condition of the carbide in the metal is affected to such an extent, by the process of hardening, as more or less completely to counteract its power to resist the decomposing effect of such an oxidizing agent as chromic-acid solution. — (*Proc. inst. mech. eng., Jan., 1883.*) C. E. M. [1106]

CHEMISTRY.

(Analytical.)

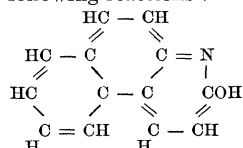
Preparation of hydric sulphide from coal-gas.—When coal-gas is passed through boiling sulphur, I. Taylor finds that nearly all the hydrogen (forty to fifty per cent) is converted into hydric sulphide. He states that this is a convenient method for the preparation of hydric sulphide for laboratory use. — (*Chem. news, xlvii. 145.*) C. F. M. [1107]

Hydric peroxide as a reagent in chemical analysis.—A. Classen and O. Bauer find that the great oxidizing power of hydric peroxide may be made available in many quantitative determinations which depend upon oxidation. Roth & Co. of Berlin manufacture a three or four per cent solution, acidified with hydrochloric or sulphuric acid, as may be desired. In an ammoniacal solution, hydric peroxide oxidizes hydric sulphide completely. This reaction affords a convenient and extremely accurate means for the determination of hydrochloric, hydrobromic, or hydriodic acid, in presence of hydric sulphide.

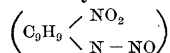
Arsenious sulphide is oxidized completely into arsenic acid and sulphuric acid. A special form of apparatus was devised by the authors for determining sulphur in sulphides. Hydric sulphide was set free by an acid, and carried forward by a current of carbonic dioxide into a tube filled with glass beads. An ammoniacal solution of hydric peroxide was allowed to drop into this tube, thereby oxidizing the hydric sulphide to sulphuric acid, which was drawn out at the bottom of the tube by means of a stop-cock. By this method accurate results were obtained in the analysis of the sulphides of antimony, tin, cadmium, iron, and of baric sulphite and hyposulphite. — (*Berichte deutsch. chem. gesellsch.*, xvi. 1061.) C. F. M. [1108]

(Organic.)

Derivatives of chinoline.—The study of the derivatives of chinoline and their constitution is continued by several chemists. W. La Coste prepared p-nitrochinoline (1:6) from p-nitraniline, p-nitracetanilide, and glycerine, and p-dimethylamido-chinoline from dimethylamido-p-phenylenediamine and nitrobenzol. o-nitrochinoline was made from o-nitraniline. m-nitraniline gave m-phenanthroline, identical with the product obtained by Skraup (*SCIENCE*, i. 283). At the same time there was formed an oxyphenanthroline whose constitution may be represented by the following reactions:—



O. Fischer prepared oxyhydroethyl- and methylchinoline by the action of the corresponding alkyl iodides on α -oxyhydrochinoline. In studying the therapeutic properties of the oxychinoline derivatives, it was found that oxychinoline possessed poisonous properties, and that the chlorides of the corresponding hydro-compounds exerted an action similar to that of chinine. β -oxychinoline and certain of its derivatives were examined by C. Riemerschmied. L. Hoffman and W. Königs prepared tetrahydrochinoline by reduction of chinoline with tin and hydrochloric acid. By the action of nitrous acid this substance gave a nitroso-amine ($\text{C}_9\text{H}_{10}\text{N}-\text{NO}$) which formed nitronitrosotetrahydrochinoline



when treated with nitric acid. The corresponding hydrazine was obtained by reduction. Indol was one of the products of the dry distillation of tetrahydrochinoline. — (*Berichte deutsch. chem. gesellsch.*, xvi. 669, 721, 727.) C. F. M. [1109]

AGRICULTURE.

Digestibility of moistened and cooked fodder.—In continuation of earlier researches on this point, G. Kühn has compared the digestibility of three samples of hay and three samples of wheat-bran, when fed dry, to that of the same fodders variously treated. Moistening the hay or bran immediately before feeding with a quantity of cold water insufficient to satisfy the thirst of the animals (steers) had no recognizable effect on the digestibility. Moistening the bran with cold water twenty-four hours before feeding had no effect on its digestibility, provided the quantity of water was so limited that the amount drunk by the animals did not fall below about fifty per cent of that drunk when the ration was given dry.

When the amount of water used to moisten the bran largely exceeded the limit just mentioned, indications of a decreased digestibility of the crude proteine of the total ration were observed. Treating the bran with boiling water twenty-four hours before feeding caused an undoubted decrease in the digestibility of its crude proteine, which was greater the higher the initial temperature, and the longer the action of the heat continued. The other constituents of the bran were unaffected. Giving the bran stirred into water as drink, along with dry hay, had no noticeable effect on the digestibility of the total ration, compared with that observed when similarly prepared bran was mixed with the hay. The experiments gave also the interesting and important result, that the extent to which the same fodder is digested by the same animal may vary at different times. A new source of error in digestion experiments is thus brought to light, and one which must receive serious consideration in all future experiments, and lead to new caution in accepting the results of old ones, especially in the case of concentrated fodders, since the calculation of the digestibility of the latter is based on the assumption of unaltered digestibility of a coarse fodder for two consecutive periods. These experiments are worthy of notice also for the care and conscientiousness with which the limits of possible error are taken account of in the discussion of the results. They afford, in this respect, an excellent example of really scientific investigation, and contrast favorably in this particular with many agricultural experiments. — (*Landw. vers.-stat.*, xxix. 1.) H. P. A. [1110]

Bottled milk.—Milk preserved by Scherff's process (heating in closed bottles to 100° – 120° C. for one or two hours) differs from fresh milk in certain respects. It is not coagulated by rennet, and when acidified, or allowed to become sour, it yields a fine, granular coagulum. These differences have been attributed to chemical changes in the albuminoids of the milk, produced by the heat; but Fleischman and Morgen fail to find in such bottled milk any peptones or other products of the decomposition of proteids, or any evidence of a chemical alteration. It appears to be a trifle less readily acted on by pepsin than fresh milk. The good results obtained by its use for sick children are ascribed to the granular coagulum which it yields in the stomach, and its freedom from all germs. — (*Landw. vers.-stat.*, xxviii. 321.) H. P. A. [1111]

Soil-temperatures.—In continuation of previous researches, E. and H. Becquerel have taken the temperature of two soils at different depths twice daily during the year 1882. One soil was naked, and the other covered with turf.

At a depth of 0.05 m., the turfed soil was the warmer at 6 A.M. At 3 P.M. the naked (sandy) soil was the warmer during the warm months, while during the cold months the reverse was the case: in other words, the range of temperature was less under the turf. At greater depths this effect became less marked, and on the average the turfed soil was 0.1° – 0.7° warmer than the naked one. — (*Comptes rendus*, xcvi. 1107.) H. P. A. [1112]

Reduction of nitrates.—The reduction of nitrates by means of an organized ferment, which has been observed by Springer (*SCIENCE*, i. p. 115), has also been the subject of experiments by Gayon and Dupetit, Dehérain and Maquenne, and de Rodionoff. The action of the ferment is prevented by oxygen and by disinfectants, and heat destroys the ferment. Large quantities of free nitrogen are produced in

the fermentation, and smaller quantities of ammonia, nitrous oxide, nitric oxide, nitrites, and probably amide-like bodies, were obtained. The action has been shown to take place in soils rich in organic matter, when excluded from the air; and a small quantity of active soil may infect a large amount of soil which has been sterilized by heat. — (*Bied. centr.-blatt*, 1883, 82.) H. P. A. [1113]

Butt and tip kernels of corn.—In a number of sprouting trials at the Ohio agricultural experiment-station, corn taken from the butts of the ears produced larger and stronger radicles than that from the tips, while that from the middle of the ear was intermediate in this respect. The proportion of seeds which sprouted was: tip kernels, 70.3 %; middle kernels, 58.2 %; butt kernels, 76.1 %. — (*Country gentleman*, May 10.) H. P. A. [1114]

GEOLOGY.

The Balkan peninsula.—In the tenth number of *Petermann's Mittheilungen* for 1882, Toulou published a geological map of this region, which gives us a better idea of the geology of that much-disputed country than any thing yet published. By a mistake, the region between Aiwadschik and Köprüköi, in Bulgaria, was colored as Jurassic instead of eocene. With this exception, this map, in sixteen colors, is fully up to Petermann's usual standard. Toulou now publishes a map on the scale of 1:2,500,000, on which, by means of twenty-five different lines, he shows the routes travelled over by different geological explorers in this region from the days of Herder, Boué, and Viquesnel (1835-37), down to the present time, and in the accompanying ten pages of text gives a brief account of the country visited, and a historical sketch of the work done by each author. — (*Mith. geogr. gesellsch. Wien*, 1883, 25.) J. B. M. [1115]

Origin of the carboniferous limestone of Belgium.—Dupont divides the carboniferous limestone of Belgium into massive and stratified limestones, the latter essentially detrital rocks with a sedimentary appearance. The massive limestones are due to the growth of corals, and are adapted to the special dispositions of coral formations in fringing reefs or islets, according to their distance from the shore. The detrital limestones are subdivided into two marked categories: the crinoidal limestone; and the limestone made up of coralline detritus, with or without interstratified beds of crinoidal limestone.

These three divisions correspond with the three faunas that de Koninck has distinguished, — the fauna of Tournai, belonging to the crinoidal limestone; the fauna of Waulsort, to the coral-reef limestones; and the fauna of Visé, to the detrital limestones. The stratigraphical study of the Belgian carboniferous limestone thus becomes much simplified; and the problems suggested by the mixture of rocks of the same chemical composition, but of different modes of formation, can be solved by studying the mode of formation, and the application of the stratigraphical laws of coral phenomena established by the study of the Devonian limestones. — (*Bull. acad. roy. Belg.*, (3), v. no. 2.) J. B. M. [1116]

PHYSICAL GEOGRAPHY.

Causes of the fertility of land in the Canadian north-west territories.—Robert Bell showed, that, with local exceptions, a vast fertile tract stretches from the Red River valley to the Liard River, a distance of some fourteen hundred miles, characterized by a dark loamy soil of varying depth and nearly

homogeneous consistency. The primary cause of the fertility of this region may be found in the character of the subsoil, which consists largely of cretaceous marls and the comminuted material of the glacial drift. The speaker ascribed to moles and other burrowing animals the chief agency in the process by which the black loamy soil was formed out of this subsoil. Darwin had proved that in England and some other countries earth-worms played the chief part in the formation of mould. These worms appear to be absent in the north-west, as well as in most cold and sparsely settled countries, perhaps due to the depth to which frost penetrates. But in the north-west he believed the ground squirrels and moles more than made up for the absence of worms. In the fertile area referred to, the old and new mole-hills cover the entire surface, rendering it 'hummocky,' as is easily observed after a prairie fire. These animals are very active in autumn, digging many more burrows than would appear to be of any use to them. Each hummock thus thrown up covers about a square foot, and buries all the grass, etc., on this space. In this manner large quantities of vegetable matter were ultimately incorporated with the soil, which was also refined by the fact that the stones and coarse gravel are left undisturbed below the surface, so that in time they are more deeply buried by the layer of mould produced. By an interesting coincidence at the season when these burrowing animals are most active, the prairie vegetation is mature, and contains the greatest amount of substance. The coldness of the soil during a great part of the year tends to preserve the organic matter in it. While the circumstances given were the direct cause of the fertility, the ultimate reason was perhaps to be looked for in the climate, which fosters the growth of such vegetation as forms both the fertilizing material and the food of the little workers, who mingle it with the mineral portion of the soil. The action of frost in comminuting the soil does not account, by itself, for the introduction of the organic matter upon which its fertility depends, and which is due to the co-operation of the circumstances and agencies described. — (*Royal soc. Canada; meeting May 23.*) [1117]

The French 'Landes.'—E. Blanc describes the great improvement effected in the formerly desert region of south-western France by planting its sandy surface with the maritime pine (*Pinus pinaster*). The region is divided according to its surface-features into five districts, locally named the Grande-Lande, the Dunes, the Marensin, the Maremme, and the Chalosse. The first includes half the entire area, and, before the tree-planting, was an open plain of loose sandy soil about two feet deep, lying on an impermeable layer (*alios*) of sandstone cemented by organic and ferruginous material. During winter it was a great marsh; in summer, a dry, sandy desert, barely supporting its flocks of sheep. The absence of stone for building and road-making was another cause of its poverty. Since 1857, nearly the whole surface has been covered with a continuous pine forest, from which the resin is a valuable product. The stilts of the old shepherds are no longer the fashion. The Dunes, extending along the coast of Gascony from the Adour to the Gironde, form a belt four to eight kilometres wide. Their sand does not come from the coasts of Spain and Brittany, as has been supposed, but from a submerged continuation of the Landes. Their height sometimes reaches eighty metres. These, also, were formerly barren: they are now almost entirely wooded over. Their area of 88,096 hectares (nearly 350 □ miles) contained 15,82

hectares of forest in 1840, and 55,584 in 1862, the unplanted part being chiefly the little valleys (lettés) between the Dunes. From 1861 to 1865 the greater part of the forests on the Dunes was sold by the government for a total of 13,000,000 francs; but, as the supply of resin from our southern states was just then diminished by the war of the rebellion, the pines were much injured by bad treatment from their private owners. The Marensin is a region of old forests included in the district of lagoons between the southern quarter of the Dunes and the Grandes-Landes as far south as Dax. It has long produced a valuable yield of resin, and is thought to have had harbors and ports in Roman times; but these have long since been destroyed by the drifting sands. The Maremme comes next farther south along the coast. It is a region of large dunes of irregular form, independent of the present coast, and probably much older than the sand-hills farther north, occupied by an old forest of cork-oaks and resin-pines. The Chalosse is the only agricultural part of the Landes. It extends southward of the Adour to the department of Basses Pyrénées, — a rolling, well-watered, fertile country. After this introductory description, M. Blanc discusses the future of the region, and its improvement by further tree-planting, and by opening a canal to connect all its lagoons behind the Dunes. — (*Rev. scient.*, 1883, 391.) W. M. D. [1118]

METEOROLOGY.

Rainfall in South Australia. — The tropical rains on the north coast prevail during the summer months, commencing generally towards the end of October or beginning of November, and lasting until April, little or none falling during the intermediate months. These tropical rains extend more or less across the interior, down to, or even south of the Peake (lat. 28°), but fall off considerably south of the Daly Waters (lat. 16° 15'). This, however, varies greatly in different years, according to the force and southerly dip of the north-west monsoon. In some cases, heavy thunder-storms and torrential rain extend over nearly the whole of the interior, and in other years the rainfall is heavy for only a few hundred miles from the north coast; and the country, especially south of the tropics, down even to the head of Spencer's Gulf, is exposed to long and severe drought. On the other hand, the winter rains occasionally extend well up into the interior, sometimes reaching or passing the centre of the continent. This, perhaps, is more especially the case when the centre of a cyclonic disturbance passes to the north of Adelaide, from west to east, and also when cyclonic disturbances in Queensland, or on the east coast, have their western quadrant extending well into the central regions of the continent and the northern pastoral districts of South Australia. But most of our disturbances have their centre south of the continent, their path being roughly parallel to the coast-line, so that as a rule our winter rains thin off, and become uncertain about a hundred miles north of the head of Spencer's Gulf, and are heavy north of the Gulf only along or near the Flinders Range. The area of minimum rainfall extends from the Great Australian Bight to Port Augusta, at the head of Spencer's Gulf; northwards up Lake Torrens and Lake Eyre; and again over the plains to the east of the Flinders Range, up to about lat. 25°, reaching on either side to within, perhaps, a few hundred miles of the east and west coasts (especially the latter). All south of this, and for some distance northwards, along and in the immediate neighborhood of the Flinders Range, we usually have good winter rains, but uncertain summer rains; the

latter being heavier and more frequent over the northern limits of this region, where they bear a large ratio to the total fall during the year. — (*Met. obs. Adelaide observ.*, 1880.) [1119]

Rainfall in France. — At the last meeting of the Meteorological society of France, a paper was read by Mr. Moureaux, showing that the law of the rains south of the central plateau of France is independent of the meteorological conditions on the oceanic side. This shows the importance of being in direct connection with Algiers. — (*Nature*, March 22.) H. A. H. [1120]

GEOGRAPHY.

(*Arctic.*)

Arctic notes. — In the year-book of the Verein für vaterländische naturkunde in Württemberg, Zeller has an article on the Algae and zoophytes of the Nordenskiöld Sea, collected by Graf Waldburg-Zeil. — *Nature* (vol. xxviii. no. 3) gives a woodcut of the Russian meteorological station at the Lena mouth. — The Leo is announced to sail for Point Barrow, June 12, from San Francisco. — The steamer Proteus is to go to the relief of the Lady Franklin Bay party, and is expected to sail about the 20th inst., or as soon as she can be joined by U.S.S. Yantic, which is to act as tender, and to utilize as far as possible the scientific opportunities of the voyage. — W. H. D. [1121]

(*Africa.*)

African notes. — In spite of the disastrous ending of the Flatter's expedition, two more parties are planned by the French for Saharan exploration, under Col. Bernard and F. Foureaux. According to a recent despatch from Wargla, four members of Flatter's party are still alive as prisoners among the Tuaregs. — In western Africa the active French advance has met with opposition. Dr. Bayol was refused permission to continue on his way to Kaarta, and has returned to Bafulabe on the Senegal. Col. Berguis-Desbordes writes from the upper Niger, that, after his losses on the way there, he must at once return to the coast unless immediately re-enforced. A sketch of the rapid progress of the French in this region is given by J. Anelle in *Rev. de géogr.*, 1883, 161-183. — R. Flegele writes from Lagos under date of March 20, 1883, of his safe return from Adamaua and the source of the Benue; his farther journey was cut short by lack of means. — The International Kongo association has despatched Lieut. v. Kerkhoven from England with supplies for the parties in the field. It is stated that he takes a number of carrier-pigeons with which to keep up communication from the interior with Zanzibar; but this must be a mistake. A general review and map of the later explorations in the Kongo basin is given in *Peterm. mith.*, 1883, 177. — News has been received from Dr. Pogge at Mukenge, on his way to the west coast, after parting from Lieut. Wissmann in the farther interior. — Dr. Holub is about to start for southern Africa after a course of special geographic study; he proposes to go northward from the Cape to the lake district. — Giraud and Thomson, recently entering Africa from Zanzibar, have been heard from in good condition, a short way on their respective journeys. — Revoll has left Somali-land for the Zanzibar region. — The French and Italian exploration about Shoa and Assab is still very active in spite of the unattractive climate of these districts. At Assab nearly all the drinking-water has to be distilled from the sea. — Schuver, the Dutch explorer, arrived in Kartum last December, and Dr. Junker is expected there shortly from his journeys in the far

interior. — Dr. Colin of the French navy has been charged with a mission to the Senegal; his instructions are to search for gold, to obtain concessions of the auriferous regions from the local chiefs, or at least protection for those who may go there, and to make geographic and scientific observations as far as possible. He expects to return to France next April. — W. M. D. [1122]

(Indian Ocean.)

Heard Island. — The U. S. S. Marion, Commander Terry, last year went to this seldom-visited island in the southern Indian Ocean (lat. 53° 20' S., long. 73° 10' E.) to search for the crew of the whaler Trinity, not heard from for eighteen months. The rescue was successful; and on Jan. 13, 1882, the men were taken from the island after over a year's endurance of excessive hardships. Ensign Chambers gives an interesting account of the expedition. The island was discovered in 1853 by an American, Capt. Heard, who believed it to be afloat, as he 'had sailed over its position repeatedly on former voyages;' but its firm anchorage is pretty well established by the presence of an active volcano, about six thousand feet high, seen in moderate eruption by the crew of the Trinity; and its antiquity is proved by marks of former glacial action which date somewhat before Capt. Heard's voyages. The climate of the island is extremely severe. Snow-squalls were of daily occurrence even in midsummer, and the air was seldom clear enough to show the mountain summit. Sea-currents pass the island from north to south. It is supposed from the appearance of clouds, and from the flight of birds and departure of sea-elephants, that an uncharted island must lie sixty or one hundred miles south of Heard; and it is even said that a certain sealing-captain has discovered an island in that direction, the position of which he keeps a secret in the interest of his trade. — (*Proc. U. S. naval inst.*, ix. 1883, 121.) W. M. D. [1123]

Indian Ocean. — On his return from Japan in April-May, 1881, G. Liebscher took samples of the water in the Bay of Bengal (about lat. 5° N.) and Arabian Sea (near lat. 15° N.), finding the specific gravity of the former at 60° F., 1.0255 to 1.0258, and its percentage of salt 3.29 to 3.34; for the latter, 1.0264 to 1.0276, and 3.40 to 3.52. — (*Mitth. erdk. Halle*, 1882, 139.) W. M. D. [1124]

BOTANY.

Cryptogams.

Diseases of the vine. — The Observations sur le Phylloxera et sur les parasites de la vigne, published under the direction of the French academy, contains a long and valuable paper by Cornu on *Peronospora viticola* B. and C., which has within a few years been introduced into the vineyards of Europe from this country. After an elaborate statement of the history of the discovery of the *Peronospora* and its spread to Europe, there follows a full account of the development and pathological action of the fungus, beautifully illustrated. The work concludes with an account of the treatment and prevention of the disease, and a comparison of the grape-mould with those of the potato and lettuce plants. — W. G. F. [1125]

Glycogen in fungi. — In a thesis entitled 'L'Épistasme des Ascomycètes,' Dr. Léo Errera demonstrates, that apart from the Myxomycetes, whose vegetable nature is not beyond question, glycogen occurs in undoubted plants, especially in the Ascomycetes, an order of fungi. It also appears to exist in the yeast-plant and *Pilobolus*, a small mould. The

glycogen of *Peziza vesiculosa* is identical with that found in the livers of mammalia. In the Ascomycetes, it is at first diffused throughout the whole young plant, but afterwards accumulates in the asci, and is apparently transformed during the maturing of the spores. When not in too small quantities, glycogen may be recognized microchemically by its semi-fluid consistency, the absence of any reaction with osmic acid, Millon's reagent, and iron salts, and by the reddish-brown or mahogany color on the application of iodine, which color disappears on heating, and reappears on cooling. — W. G. F. [1126]

Spores and spore-cases in Erian rocks. — Dr. J. W. Dawson spoke of the discovery many years since, by the geological survey of Canada, in a pyroschist or bituminous shale at Kettle Point on Lake Huron, — referred to the horizon of the Marcellus beds of the New-York series, — of vast numbers of minute disks, which were recognized as the spore-cases of some cryptogamous plant, and were by him named *Sporangites huronensis*. More recently Profs. Orton of Columbus, O., Williams of Cornell university, and Clarke of Northampton, Mass., have found, in the Erian (Devonian) and lower carboniferous shales of Ohio and New York, beds replete with these organisms; and Prof. Orton has shown reasons for believing that they are connected with filamentous stems found in the same layers, and, moreover, that they have contributed largely to the bituminous matter present in the shales in which they occur. Similar bodies have also been found associated with the curious plants known as *Psilophyton* and *Trochophyllum*. Still more recently specimens from the Erian of Brazil have been sent to the author by Mr. Derby of the Brazilian geological survey, which seem to throw additional light on the bodies in question. These specimens present oval or rounded bodies in the form of flattened sacs, containing numbers of rounded disks similar to those above referred to, and so closely resembling the utricle, or spore-sacs, of the rhizocarps as to make it extremely probable that they belonged to plants of this class. Should this conjecture be sustained by subsequent inquiries, it would show that this peculiar group is of much greater antiquity than hitherto supposed, and that these plants were extremely abundant in the shallow waters of the Erian period. Dr. Dawson further suggested probable relations of these singular fruits not only with *Psilophyton*, but also with other Erian and Silurian plants. — (*Royal soc. Canada: meeting May 23.*) [1127]

ZOOLOGY.

Mollusks.

Land-snails from Bering Strait and Alaska. — Drs. Aurel Krause and Reinhardt enumerate and describe the land-snails obtained by the Krause brothers in the Chukchi peninsula and in south-eastern Alaska. Seven species were obtained from the former locality, and nineteen in the latter. Most of them are common to both shores. As a matter of much interest to American conchologists, the species new to the fauna of the United States, as determined by them, may be mentioned. Omitting mere varieties, these are: *Limax hyperboreus* West., *Conulus pupula* Gould (originally described from Japan), *Pupa Gredleri* Cless., *P. krausiana* Reinh., *P. arctica* Wall., *Succinea chrysis* West., *Vallonia asiatica* Neville (Yarkand, described by Neville as a variety of *V. costata*), and *Pupa edentula* Drap. (probably). Dr. Reinhardt also describes, under the name of *Vallonia gracilicosta*, a small shell obtained by Krause on the Little Missouri River, while

returning home by the route of the Northern Pacific railway (*Sitz. Berl. ges. naturf. fr.*, 3, 1883). In the same connection, the following species of the Vega expedition are of interest for American students. Westerlund, in advance of the final publication, describes as new, from the same region, *Helix rudrata* var. *opulens*, collected at Bering Island; *Succinea annexa* and *chrysis*; and *Pisidium arcticum*, *nivale*, and *glaciale*, from Port Clarence, Alaska. — (*Nachr. deutsch. mal. ges.*, April, 1883.) W. H. D. [1128]

A man-eating mollusk. — A minute pulmonate, *Cionella acicula*, was not long since reported as occurring in myriads in the cavities of cancellate bones in a prehistoric British cemetery at Chichester. It has now been found of unusual size, by Director Fischer, in human skulls from comparatively recent interments at Bernberg. — (*Nachr. deutsch. mal. ges.*, April, 1883.) W. H. D. [1129]

Monograph of Onchidium. — The last-received part of Semper's land-mollusks of the Philippines contains the continuation of an extremely thorough monograph of *Onchidium*, — the genus of slugs in which that author made the discovery of the extraordinary 'dorsal eyes,' and which seems to be prolific in species in the east. The new genus *Onchidina* is established for *O. australis* Gray, which exhibits marked anomalies in the genitalia. — (*Semper's reisen.*, heft iv.) W. H. D. [1130]

VERTEBRATES.

Centripetal stimulation of the vagus. — In a previous paper (*Wiener sitzungsb.*, lxxxv., 282), Knoll had pointed out that the vagus nerve may be stimulated by the making or breaking of its own current, when the nerve, for instance, is raised from the moist tissue upon which it lies, or, after being raised, is again lowered into the wound. This is especially the case after exposure, or section, or other mechanical injury. The effect of such a stimulation is, in the great majority of cases, the production of an expiratory standstill, or a flattening of the respiratory curve toward the expiratory position. In many cases the action is not confined to a mere inhibition of the inspiratory discharge, but causes an active expiratory effort. In this, his second contribution to the theory of the innervation of the breathing movements, he submits the action of electrical, mechanical, chemical, and thermal stimuli upon the central end of the vagus to a new investigation, taking care to avoid any secondary effects arising from stimulation of the nerve by its own current. The experiments were made upon rabbits, to some of which a minimal dose of chloral was given. The effect of induction shocks was found to vary with the strength of current used, minimal currents causing a short expiratory pause, or a displacement of the curve toward the expiratory position; stronger currents giving inspiratory effects. During the period of vagus stimulation, although there is always a certain amount of dyspnoea, nevertheless the accessory respiratory muscles do not come into action, and, if previously in action, become relaxed during the stimulation. Neither anaemia of the brain, caused by blocking off the blood-current, nor respiratory reflexes from other afferent nerves, stimulation of the nasal mucous membrane, for instance, produce any breathing movements during the inspiratory standstill which follows strong electrical stimulation of the vagus. From these facts he concludes, that, during such stimulation of the vagus, the irritability of the respiratory centre toward other stimuli, especially natural stimuli, is greatly depressed. He finds that the effects obtained may differ according

to the direction of the current, the portion of the nerve stimulated, the condition of the nerve and of the respiratory centre, — conditions which may explain the contradictory results obtained by those who have worked at the subject. Mechanical stimuli produced in various ways gave always, as the primary effect, either complete standstill in inspiration, or strong displacement of the curve toward the inspiratory position. Chemical stimuli inhibited respiration in the expiratory phase. Thermal stimuli had apparently no effect. Warming the vagus in 0.6 % salt solution or oil from 1½°–2° to 45°–60° C. had no action on the respiration. — (*Wiener sitzungsb.*, lxxxvi., iii. 48.) W. H. H. [1131]

Activity of the yolk during impregnation. — Kupffer recalls the active movement of a protoplasmic hillock on the surface of the ovum of *Petromyzon*, observed by August Müller, Calberla, and himself, immediately after the spermatozoon entered the yolk. He now reports a similar observation on *Bufo*. In this animal several spermatozoa enter the ovum; but those that reach the egg a few minutes after spawning are not able to pierce the egg-membrane. One then sees little protuberances arise on the surface of the yolk, and stretch up the membrane. Opposite each protuberance are one or two spermatozoa, their heads towards the yolk. It appears as if the yolk were actively striving to reach the spermatozoa. In a few minutes the protuberances sink back. In both *Bufo* and *Petromyzon* there appears this secondary act of impregnation after the male elements (or element) have penetrated the yolk. — (*Sitzungsb. akad. wiss. München*, 1882, 608.) C. S. M. [1132]

ANTHROPOLOGY.

Growth of the skull in dogs. — M. Lacassagne having communicated to the biological society of Lyons a paper on the cranial dimensions in man in their relation to social condition and intellectual culture, Dr. Arloing has followed up the subject upon dogs. Discarding the merely instinctive faculty, attention was paid only to the intellectual. The subject of weight and race was so far considered as to render it easy to make allowance for these, since the average weight of the well-known breeds is known everywhere. The following table tells its own story: —

	Weight of the skull.	Weight of brain.
	Grams.	Grams.
St. Bernard	100.39	387
Large spaniel (Grand epagneul)	85.5	695
Bull, medium size	81.14	205
Bull, small size	53.2	110
Little spaniel	50.7	67
Loulou	53.9	62
Havana	73.6	60
King Charles	50.7	45

The brain of a small ape weighs from seventy to seventy-five grams. We see from the table that the weight of the head is doubled, while the weight of the brain is eight times greater, between the extremities of the table. The difference would be much greater if we could compare the weight of the brain with that of the body. The conclusion reached is, that education increases the dimensions of the skull in animals as in man. — (*Bull. soc. anthrop. Lyon*, i. 44.) J. W. P. [1133]

Criminality in France.—"Society, in its moral and social aspect," says M. Lacassagne, "is divided into three strata,—the frontal, the parietal, and the occipital; the latter including the most of our race." The causes which operate upon the human organism are cosmic and social; or, as M. Lacassagne has it, physico-chemic, biologic, and social. The first includes temperature, physical forces, aliment, etc., acting, first, upon the posterior part of the brain, thence forward, influencing the instinct to control the intelligence. The second includes sex, age, heredity, temperament, acting equally on all parts of the brain, and giving to the sentiments, thoughts, and acts a characteristic peculiarity. The last, acting from the front brain backwards, modifies the ideas before changing the sentiments.

The penal code of France divides infractions of the laws against persons and property into contraventions, délits, and crimes; and, for seeking out and punishing these, an army of two hundred thousand individuals is engaged, costing 41,694,720 francs, against 26,034,016 for primary public instruction.

M. Lacassagne, after reviewing the works of Quelet, Guerry, Maury, and Ferri, on the statistics and philosophy of crime, proceeds to furnish, in a series of curves, the results of his own researches. It is well observed, that, in studying a series of years, notice must be taken of the changes in the law and the multiplication of recognized infractions. Crimes against property vary with the price of breadstuffs, the operation of tariff, warm summers, rigorous winters. Crimes against persons are shown to be influenced by revolutions, elections, the wine-crop, etc.

The relation of crime to the season of the year presents some interesting facts, the table showing a criminal calendar in which the maxima of crimes against property are placed opposite to the minima of crimes against persons. The former have their maximum in December, their minimum in April and June. The latter have their minimum in November, and their maximum in June. Each crime is then scrutinized by months, according to the causes affecting it, such as heat and cold, wine-production, harvests, forced indoor life in winter, wandering life in summer, the length of the day and night, fêtes, holy days, pay-days, reaping-time, vintage-time, salaries to domestics, etc. For instance, infanticide is large in January, February, March, and April, as the effect of the aphrodisiac months, while abortions, usually at the fifth month, are numerous in January; conceptions of harvest-time, at their maximum in March; conceptions of the new-wine season, high in May; conceptions of Christmas holidays, high in June; con-

ceptions of the carnival, ascending in September, October, November, and December, owing to the aphrodisiac months.

Assassination, murder, parricide, poisoning, theft, are similarly treated, and the relation of crime to sex and illiteracy examined. M. Lacassagne closes his discussion with observations on the prevention of crime. — (*Bull. soc. anthropol. Lyon*, i. 48-71.) J. W. P. [1134]

EARLY INSTITUTIONS.

Writing among the Romans.—M. Havet points out the curious fact, that Greece had a literature before she had the means of recording it, while Rome had the means before she had the literature. It is certain that in Greece literature existed at first independently of writing; but in Rome writing was in use during the period of the kings, when there was no literature. This fact being established, M. Havet asks whether writing was introduced during the time of the kings, or before that time, i.e., before the foundation of Rome. He then goes on to show how the Romans must have used writing before they came into contact with the Etruscans, because they did not adopt the Etruscan alphabet. Writing must have been in use, he concludes, in the earliest period of the history of Rome, if not before the foundation of the city. Then he argues, if this is the case, what right have we to suppose that the early kings are fabulous? If they knew how to write, it is probable that they put their names in writing. The question is raised, What did the Romans do with their writing, if they did not use it to record events which actually happened? They had no literature to give it a *raison d'être*. The argument is an interesting one. — (*Rev. polit. et litt.*, 24 Mars, 1883.) D. W. R. [1135]

Beginnings of taxation in France.—M. Vuitry continues his studies in the financial history of France, and describes the origin and establishment of state taxes as distinguished from the revenues of a feudal sovereign. These, he tells us, must not be regarded as state taxes. He defines state taxes as taxes levied upon all citizens for the purpose of defraying public expenses. During the early feudal period there were no public expenses: therefore there were no state taxes. The expenditures of the feudal sovereign were private expenditures; his revenues were private revenues, derived chiefly from his estates, or from privileges attached to his person. It was not until the fourteenth century (1328-55) that state taxes, properly so called, were instituted. M. Vuitry explains how this came to pass. — (*Séan. trav. de l'acad.*, Avril-Mai, 1883.) D. W. R. [1136]

INTELLIGENCE FROM AMERICAN SCIENTIFIC STATIONS.

GOVERNMENT ORGANIZATIONS.

Bureau of ethnology.

Note on certain Maya and Mexican manuscripts.—Professor Cyrus Thomas has recently prepared a paper for the bureau, on a plate of the *Codex Cortesianus*, reproduced in plates 9 and 10 of Rosny's *Les documents de l'antiquité Américaine*, and plate 44 of the *Fejervary Codex* (Kingsborough, vol. iii.). For the benefit of scholars devoting attention to these manuscripts, a brief *résumé* of his explanation of one discovery that he has made in regard to them is here given. As facsimile plates cannot be intro-

duced here, plans of the portions referred to are figured on the assumption that those particularly interested have access to the works in which the plates are to be found.

Mr. Thomas maintains, with a strong array of evidence, that these plates are simply a kind of condensed calendar, and that the outer looped line of dots and day-symbols in each is a mere table by which to tell the days on which the weeks (of thirteen days) for the entire year begin.

If we examine carefully the rows of large dots, and the day-symbols in the large outer space of the Cortesian plate, as given by Rosny, we shall find, that, taken together, they form but *one continuous line*,

making one outward and two inward bends or loops at each corner, as shown in fig. 1.

In this figure the dots correspond with those in the plate; the circle, with the day-symbols. The numbers

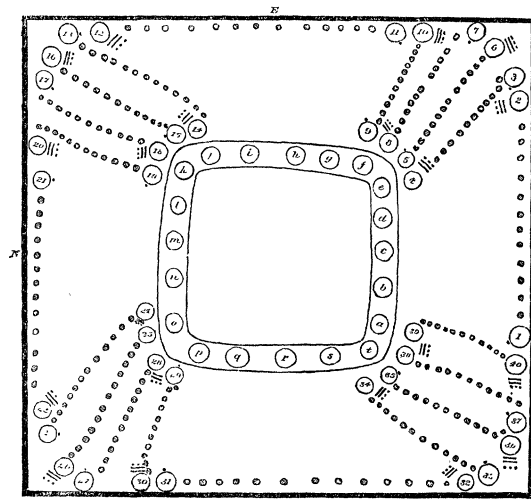


FIG. 1. — SCHEME OF THE CORTESIAN PLATE.

correspond with the numbers in the following list, in which the names are given, as shown by the symbols; those obliterated in the original are in *italics*.

1 Cauac.	15 Oc.	28 Ahau.
2 Chuen.	16 <i>Ik</i> .	29 Ymix.
3 Eb.	17 <i>Akbal</i> .	30 Ben.
4 Kan.	18 <i>Men</i> .	31 <i>Ix</i> .
5 Chicchan.	19 Cib.	32 Cimi.
6 Caban.	20 Lamat.	33 Manik.
7 Ezanab.	21 Muluc.	34 Cauac.
8 Oc.	22 Ymix.	35 Ahau.
9 Chuen.	23 <i>Ik</i> .	36 Eb.
10 Akbal.	24 <i>Ix</i> .	37 Ben.
11 Kan.	25 <i>Men</i> .	38 Chicchan.
12 Cib.	26 Manik.	39 Cimi.
13 <i>Caban</i> .	27 Lamat.	40 Ezanab.
14 Muluc.		

Starting with 1 Cauac (No. 1) on the right side, and running upward toward the top, along the row of dots next the right-hand margin, we reach 13 Chuen (No. 2). Just above this is 1 Eb (No. 3). Running inward toward the centre, along the row of dots, we reach 13 Kan (No. 4). Then passing upward, we come to 1 Chicchan (No. 5); then outward along the row of dots, toward the outer corner, to 13 Caban (No. 6); thence to the left to 1 Ezanab (No. 7); then inward to 13 Oc (No. 8); then to the left to 1 Chuen (No. 9); then outward to 13 Akbal (No. 10); and so on around toward the left.

The number of the day is usually indicated by a numeral symbol, — one dot for 1, and two short lines and three dots for 13.

By commencing with *Cauac*, and writing the twenty Maya days in succession, repeating them in the same order, numbering them from 1 to 13, and 1 to 13 again, or by referring to table V. of Professor Thomas's *Study of the manuscript Troano* (fig. 11), the reader will find that the days numbered 1 of the looped

line (as 1 Cauac, 1 Eb, etc.) are always the first days of the Maya week, and those numbered 13 (as 13 Chuen, 13 Kan, etc.) are always the last days of the week.

The Cauac years alone have been referred to; but this calendar is made to answer equally as well for the Kan, Muluc, and *Ix* years. For the Kan years we begin with 1 Kan (No. 11) in the top row; for the Muluc years, with 1 Muluc (No. 21) in the row next to the left margin; and, for the *Ix* year, with 1 *Ix* (No. 31) in the bottom row.

The proof of Professor Thomas's interpretation of this part of the 'Cortesian plate' seems to be conclusive.

The signification of plate 44 of the Fejervary Codex he claims to be substantially the same as the other; and that the outer looped line shown in our fig. 2 is constructed on precisely the same plan, and for the same purpose; the only difference being, that here only the first day of the week is given, and that the days are Mexican instead of Maya.

The twenty circles at the corners and loops containing numbers indicate and replace Mexican day-symbols, as shown in the following list: —

1 Cipactli.	8 Malinalli.	15 <i>Calli</i> .
2 Ocelotl.	9 Coatl.	16 Cozcaquauhtli.
3 Mazatl.	10 Tecpatl.	17 Atl.
4 Xochitl.	11 Ozomatli.	18 Ehecatl.
5 <i>Acatl</i> .	12 Cuetzpalin.	19 Quauhtli.
6 Miquiztli.	13 Ollin.	20 <i>Tochtli</i> .
7 Quiahuitl.	14 Itzcuintli.	

The four in the larger circle, italicized in the list, are the four year-bearers or year-names.

By making a list of Mexican days in succession, beginning with Cipactli, and numbering from 1 to 13 as before, and following the line in the order

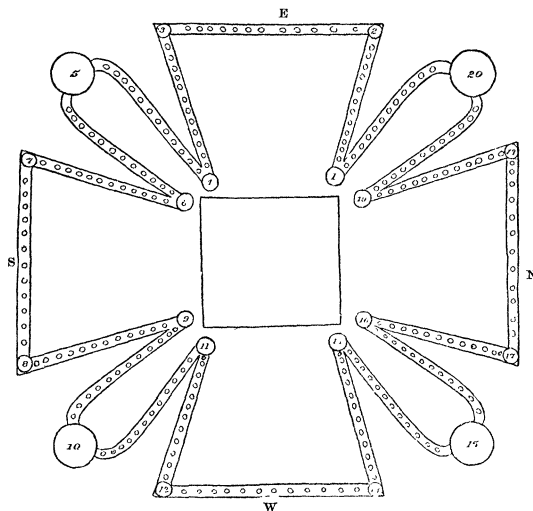


FIG. 2. — SCHEME OF THE FEJERVARY PLATE.

of numbering, as shown in fig. 2 (around to the left), we find that each day is the first of a Mexican week.

Mr. Thomas also gives interpretations of the outer parts, but these are too long and intricate to be given in this brief article.

NOTES AND NEWS.

Professor Charles A. Young writes from Princeton, N.J., June 13, "I have received from Professor Holden the following telegram, announcing the success of the eclipse expedition:" —

SAN FRANCISCO, Cal., June 11.

American eclipse expedition arrived at San Francisco, June 11. Holden reports no Vulcan as bright as $5\frac{1}{2}$ magnitude. Hastings's observations prove the corona to be largely a phenomenon of diffraction by the great change in length of 1474 line on east and west sides of sun. No black lines in corona spectrum but D. Full observations with grating spectroscope, prismatic telescope, and integrating spectroscope, by Rockwell, Upton, and Brown. Contacts by Preston. English and French parties successful. (Signed)

E. S. HOLDEN.

From a fuller telegraphic report in the *New-York tribune*, it appears that our party reached Caroline Island on April 20, and the French party two days later. The weather was favorable on the day of the eclipse, and all the observations that had been planned were fully carried out. The English observers who accompanied the American party, and to whom all photographic observations were made over, obtained negatives both of the corona and of its spectrum, the latter containing a number of bright lines. They also got a photograph of the reversal of the lines at the beginning and end of totality, and presumably a number of other plates at intermediate stages.

The French observers obtained photographs of the corona and of the whole region of sky near the sun (showing the stars — or at least taken for that purpose, in hopes of thus photographically catching Vulcan). They report dark lines in corona spectrum.

Professor Hastings's observations of the change of length in the 1474 line on the east and west sides of the sun relate to a theory recently proposed by him, that the 'apparent corona,' as it may be called, is mainly a *diffraction* phenomenon, the *real* corona itself being only a very narrow ring around the sun, optically widened out by diffraction (not refraction) at the edge of the moon into the extensive halo actually observed. Professor Hastings arranged an apparatus by which the coronal spectrum on both sides of the sun could be simultaneously observed, and found that at the beginning of the totality the 1474 line was 12' long on the east side, while it was short and faint on the west. As the eclipse advanced, this inequality disappeared, and at its close was reversed, the change being much greater than could be ascribed simply to the moon's motion. While the observation accords satisfactorily with the new theory, it is, however, doubtful whether it will be regarded as *proving* it, since the effect can also be explained simply as a phenomenon of aerial illumination.

The corona is reported as having been bright, with

five well-defined streamers, of length not stated. The chromosphere was unusually quiescent.

Messrs. Brown and Preston were left at Honolulu to make pendulum observations. All the members of the party are reported as in good health. The French party are also expected at San Francisco in a day or two.

— The instructions of the Greely-relief party have been published. They are to endeavor to reach Greely by ship if possible. The *Proteus* has been chartered for the occasion. If unsuccessful, they are to winter at Lifeboat Cove, Littleton Island; though why they should get on the side farthest from the party to be rescued is not clear. Sledge-journeys will be made, if practicable, after winter sets in; though the time when Smith's Sound may be crossed by sledges to Cape Isabella cannot be early in the season, and may not present itself at all. 'Three hard-ice men' are to be taken from St. Johns, and apparently will be the only members of the party having any knowledge or experience of the arctic regions, the rest being officers and enlisted men of the U.S. army. As the expedition has been contemplated for a year at least, it seems unfortunate that the experience of Lieut. Schwatka could not have been brought to bear on the outfit and plans. The instructions state that Greely's supplies will be exhausted in the coming autumn, which is a surprise to those who were informed by the public prints, at the time his expedition set out, that he was provisioned for three years. It is evident that the question of rescue is even more grave than has been generally understood, especially when the usual impracticability of crossing Lady Franklin Sound on the ice (as established by the Nares expedition) is taken into account. Mr. Beebe will not accompany the relief party. The U. S. S. *Yantic* will accompany the *Proteus* as tender.

Messrs. H. G. Dresel and A. A. Ackerman, ensigns, U.S. navy, accompany the Greely relief party to Greenland as naturalists attached to the U. S. S. *Yantic*. Both of these gentlemen have, during the past eight months, been acting as assistants in the U. S. national museum at Washington, the former in the department of fish, the latter in the department of mineralogy. They are mainly equipped for collecting marine objects, and interesting results in the line of fish and marine invertebrates are expected from them.

— *Nature* states, that at a meeting of the subscribers to the Balfour memorial fund, held at Cambridge on the 26th inst., it was stated that £8,309 had been promised, all except £100 of which had been paid. Of this, £8,078 had been invested, yielding an annual income of £284 10 s., which it was hoped further subscriptions would raise to £300. Among the regulations agreed to were the following: the income of the fund shall be applied, (1) to endow a studentship, the holder of which shall devote himself

to original research in biology, especially animal morphology; (2) to further, by occasional grants of money, original research in the same subject. The student shall not necessarily be a member of the university, and, during his tenure of the studentship, shall devote himself to original biological inquiry, and shall not systematically follow any business or profession, or engage in any educational or other work, which, in the opinion of those charged with the administration of the fund, would interfere with his original inquiries. The place and nature of the studies of the student shall be subject to the approval of the managers, provided that the student shall be bound to pursue his studies within the university during at least three terms during his tenure of the studentship, unless the managers shall, with the approval of the board, dispense with this requirement for special reasons. The managers shall take such steps as they may think necessary to satisfy themselves as to the diligence and progress of the student, and may require from him any reports or other information on the subject of his studies which they may think desirable. The studentship shall be tenable for three years; but it may be continued over a second term of three years (but no longer) to the same person, if the managers and board decide that it would be clearly in the interests of biological research. The balance of the income of the fund, after providing for the studentship and for any necessary expenses connected with the election, shall be devoted to the furtherance of original research in biology, especially animal morphology. Grants may be made for this purpose either to the holder of the Balfour studentship or to any other person engaged in research.

--From a circular issued to the members of the American committee of the Balfour memorial fund, we learn that the subscriptions received by the treasurer up to June 11 amounted to \$634.95. The expenses incurred were \$31.05, leaving a balance of \$603.90, which has been forwarded to the general treasurer of the fund in England.

—During the winter of 1883-84, series of lessons will be delivered before the Teachers' school of science in the Lowell free courses. Teachers will please note the fact, that these lessons are chiefly upon one subject, chemistry, and that the first course of five, by Mr. Norton, is preparatory for the other two courses. First course: Elements of chemistry, by Lewis M. Norton of the Massachusetts institute of technology; First principles of chemistry; The chemistry of the air; The chemistry of the water; The chemistry of combustion; The chemistry of the metallic elements. This course will be illustrated by the simplest apparatus which can be used for such purposes. Second course: Practical examination, with simple apparatus, of the physics and chemistry of vegetable physiology, by Professor George L. Goodale of Harvard university; Vegetable assimila-

tion; The mode in which plants prepare food for themselves and for animals; The kinds of food stored in vegetable organs; Illustrations of the starches, sugars, oils, and albuminoidal matters; How food is used by plants and animals in the formation of new parts; Mechanics of growth; How food is used in work of all kinds by different organisms; Adaptation of organisms to extremes of heat and light, chiefly with respect to geographical distribution. The teachers in the audience will be supplied with simple apparatus; and this course and Mr. Crosby's will be made experimental and thoroughly practical so far as this is possible. The series will be concluded by five lessons on chemical principles illustrated by common minerals, by W. O. Crosby of the Massachusetts institute of technology, which cannot at present be more fully described.

—The new Fish-commission steamer *Albatross* has recently arrived at the Brooklyn (N.Y.) navy-yard from her first extended cruise, which covered the region from Cape Hatteras to Newport (R.I.). The main object of this cruise was to thoroughly test the various appliances of research before starting upon the regular campaign, which will begin about July 1. A considerable amount of stormy weather was encountered; but in the worst of it the new ship behaved splendidly, the greatest roll recorded having been only about 29 degrees. Numerous dredgings and soundings were made down to a depth of 1,168 fathoms, and a large amount of valuable zoological material was obtained. Experiments were also made with the powerful electric lamps for lighting up the sea. Considering the inexperienced crew, and the newness of all the appliances, this first trip has been entirely satisfactory. At Brooklyn the *Albatross* will receive a new coat of paint, after which she will repair to Washington to fit up for the summer work.

—The summer investigating party of the U. S. fish-commission, with the commissioner, Professor Baird, will leave for the Wood's Holl (Mass.) station about July 1, for a stay of three months or longer. The party will consist of the same members as during the past two years, Professor Verrill, of Yale college, being in immediate charge of the zoological work. The new steamer *Albatross* will make her trips from the same place, and the *Fish Hawk* will engage in dredging and trawling in the neighboring regions. Arrangements are now nearly completed for starting work upon the new wharf in the big harbor, and upon the laboratory and dormitory buildings, which are to occupy sites at the inner end of the wharf. These structures will all be in readiness for the season of 1884.

—The new Parkes museum of hygiene was opened in London, May 26. The Duke of Albany delivered the opening address. Among the speakers were Sir Charles Dilke, Professor Tyndall, and the Archbishop of York.